NEI 99-02 Revision 0

Regulatory Assessment Performance Indicator Guideline

March 2000

NEI 99-02 Revision

Nuclear Energy Institute

Regulatory Assessment Performance Indicator Guideline

March 2000

Nuclear Energy Institute, 1776 I Street N.W., Suite 400, Washington D.C. (202.739.8000)

ACKNOWLEDGMENTS

This guidance document, Regulatory Assessment Performance Indicator Guideline, NEI 99-02, was developed by the NEI Safety Assessment Task Force in conjunction with the NRC staff. We appreciate the direct participation of the many utilities, INPO and the NRC who contributed to the development of the guidance.

NOTICE

EXECUTIVE SUMMARY

The Nuclear Regulatory Commission is revising its regulatory oversight processes of inspection, assessment and enforcement for commercial nuclear power plants. The new processes rely primarily on two inputs: Performance Indicators and NRC Inspection Findings. The purpose of this manual is to provide the guidance necessary for power reactor licensees to collect and report the data elements that will be used to compute the Performance Indicators.

An overview of the complete oversight process is provided in NUREG 1649, "New NRC Reactor Inspection and Oversight Program." More detail is provided in SECY 99-007, "Recommendations for Reactor Oversight Process Improvements," as amended in SECY 99-007A.

[This page intentionally left blank.]

Summary of Changes to NEI 99-02
Draft Revision D to Revision 0

No.	Page	Topic	Change
1.	Page i	Executive Summary	Deleted discussion of pilot program.
2.	Page 2	Introduction; General Reporting Guidance	Changed quarterly report submittal date from 14th to 21st.
3.	Page 2	Introduction, General Reporting Guidance	Added paragraph that discusses treatment of issues regarding interpretation or implementation of NEI 99-02.
4.	Page 3	Introduction, General Reporting Guidance	Added paragraph regarding NRC treatment of comments received via quarterly reports.
5.	Page 3	Introduction, General Reporting Guidance	Removed reference to Containment Leakage PI.
6.	Page 4	Introduction, Applicability of NEI 99-02, Revision 0	Added paragraph discussing applicability of Revision 0 and status of data collected and submitted using guidance from prior revisions of NEI 99-02. Because data collection activities for the 1st quarter 2000 are well underway, data collection in support of the April 21st data submittal can use guidance contained in NEI 99-02 Draft Revision D or Revision 0.
7.	Page 4	Introduction, Submittal of Performance Indicator Data	Revised paragraph discussing process for quarterly report submittal. Deleted paragraphs related to historical data reporting.
8.	Page 5	Introduction, Frequently Asked Questions	Added discussion on status and treatment of Frequently Asked Questions.
9.	Page 7	Table 1	Table revised to reflect NRC changes to performance indicator thresholds based upon review of historical data submittals. Added placeholders for later inclusion of threshold values for hydro-electric generators. Added "≤ 2EDG" for clarification.
10.	Page 8	Table 1	Table revised to reflect NRC changes to performance indicator thresholds based upon review of historical data submittals. Removed Containment Leakage PI. Added revision to Green-White threshold for Protected Area Security Equipment Performance Index. Removed White-Yellow threshold value for Protected Area Security Equipment Performance Index. Revised Occupational Radiation Safety time frame from 12 Quarters to 4 Quarters and revised the thresholds
11.	Page 11	Unplanned Scrams	Added additional example of scrams that are to be included for this indicator.
12.	Page 11	Unplanned Scrams (similar change made for all performance indicators)	Moved approved FAQs for this indicator to new subsection. FAQs revised to reflect changes incorporated in Revision 0. Similar change for all performance indicator FAQs.
13.	Page 12	Frequently Asked Questions	FAQs added

No.	Page	Topic	Change
14.	Page 14	Scrams with a Loss of Normal Heat Removal	Clarified Purpose and Indicator Definition sections. Also, replaced "prior to achieving hot shutdown (PWRs) or hot standby (BWRs)" with "prior to establishing reactor conditions that allow use of the plant's normal long term heat removal systems."
15.	Page 16	Frequently Asked Questions	FAQs added.
16.	Page 17	Data Example	Modified to reflect threshold change.
17.	Page 20-21	Frequently Asked Questions	FAQs added.
18.	Page 22	Data Example	Modified to reflect threshold change.
19.	Page 23	Mitigating Systems	Added paragraph on differences between NEI 99-02 and INPO/WANO, Maintenance Rule guidance.
20.	Page 23 Page 25	Mitigating Systems	Removed reference to Isolation Condensers. Performance of Isolation Condenser systems will not be captured as part of the SSU PI.
21.	Page 26	SSU Clarifying Notes	Replaced paragraph on exemption of planned unavailable hours for testing. Added clarifications to include prompt restoration of function with uncomplicated (a single or a few simple) actions.
22.	Page 27	SSU Clarifying Notes	Added clarifying note allowing exemption of planned unavailable hours for on-line planned overhaul maintenance of systems.
23.	Page 29	SSU Clarifying Notes	Added "after 4 quarter have elapsed" to discussion on removing fault exposure hours. Added instruction on removal of hours in a change report.
24.	Page 30	Installed spare	Deleted reference to limiting condition for operation (LCO). Deleted wording that required avoidance of LCO to be considered for "installed spare".
25.	Page 32	SSU, Systems Required to be in Service at All Times	Removed "BWR" to enable application to both PWRs and BWRs. Changed "closed-cycle, forced" to "NRC approved". Specified that suppression pool cooling is associated with a BWR.
26.	Page 35	Question ID 14	Clarified uncomplicated as a single action or a few simple actions
27.	Page 36	Question ID 19	Added clarifying sentence to response
28.	Page 37	Question ID 70	Revised question to delete reference to Draft C and D
29.	Page 38	Question ID 73	Deleted reference to Draft D and updated question and response to Revision 0 guidance. Removed reference to historical submittal.
30.	Page 38	Question ID 74	Deleted reference to Draft D
31.	Page 39	Question ID 86	Deleted reference to Draft D
32.	Page 39	Question ID 88	Deleted reference information to Draft D and simplified question.
33.	Page 40-43	Frequently Asked Questions	FAQs added.
34.	Page 45	Graph	Modified to reflect threshold change.
35.	Page 47	Emergency AC Power Systems	Changed "operable" to "functional".
36.	Page 54	BWR Heat Removal	Removed reference to Isolation Condensers. Performance

No.	Page	Topic	Change
		Systems	of Isolation Condenser systems will not be captured as part of the SSU PI.
37.	Page 55	Figure 3.2	Deleted Figure 3.2 related to Isolation Condensers. Performance of Isolation Condenser systems will not be captured as part of the SSU PI.
38.	Page 79	Safety System Functional Failure	Added clarification to definition of *Engineering Analysis* concerning if the system is removed from service to perform the analysis.
39.	Page 80	Frequently Asked Questions	FAQs added.
40.	Page 81	Data Example	Modified to reflect threshold change.
41.	Page 83	Barrier Integrity Cornerstone	Revised wording to reflect removal of Containment Leakage PI
42.	Page 85	Question ID 72	Provided response.
43.	Page 85	Question ID 84	Deleted reference to Draft D and to PIWeb software.
44.	Page 87	RCS Leakage	Added clarifying note on counting of all calculations of RCS leakage that are computed in accordance with the calculational methodology requirements of the Technical Specifications.
45.	Page 87	RCS Leakage	Added sentence on reporting for months when RCS leakage calculation is not required.
46.	Page 88	Frequently Asked Questions	FAQs added.
47.	Page 91	Drill/Exercise Performance	Added clarifying note relative to NRC response to actual events.
48.	Page 96	Frequently Asked Questions	FAQs added.
49.	Page 102	Question ID 85	Deleted reference to Draft D.
50.	Page 103	Frequently Asked Questions	FAQs added.
51.	Page 106	Alert and Notification System	Added clarifying note on sirens that are out of service.
52.	Page 106	Question ID 56	Changed “prior to next test” to “prior to test”
53.	Page 106	Frequently Asked Questions	FAQs added.
54.	Page 110	Occupational Exposure	Revised description of PI calculation to reflect 4 quarter calculation.
55.	Page 112	Occupational Exposure	Deleted paragraph discussing individual occurrences of access or entry into an area.
56.	Page 117	Question ID 95	Deleted reference to Question #5.
57.	Page 119	Frequently Asked Questions	FAQs added.
58.	Page 121	Graph	Changed threshold.
59.	Pages	Public Radiation Safety	Clarification of monitoring program to control program.

No.	Page	Topic	Change
	122-123		Clarifications of site vs. unit reporting. Added reference to instantaneous dose-rate values.
60.	Page 130	Question ID 77	Deleted reference to Draft D and referenced FAQ 60.
61.	Page 132	Frequently Asked Questions	FAQs added.
62.	Page 134	Graph	Changed thresholds.
63.	Page 136	Frequently Asked Questions	FAQs added.
64.	Page 139	Frequently Asked Questions	FAQs added.
65.	App B	Structure and Format of NRC Performance Indicator Data Files	Removed previous Appendix B information on historical data submittal and replaced with guidance on structure and format of quarterly data submittals.
66.	App C	Background Information and Cornerstone Development	Moved PI FAQs to subsections for each PI. Moved "Background Info.." from old Appendix D to Appendix C. Retained "General FAQs" as part of new Appendix C and assign FAQ numbers. Page C-3 clarifies containment barrier integrity will be ensured through the inspection process.
67.	App D	Plant Specific Design Issues	Added new appendix to reflect resolutions of plant specific PI reporting issues.

TABLE OF CONTENTS

APPENDICES

1 INTRODUCTION

This guideline describes the data and calculations for each performance indicator in the Nuclear Regulatory Commission's (NRC) power reactor licensee assessment process. The guideline also describes the licensee quarterly indicator reports that are to be submitted to the NRC for use in its licensee assessment process.

This guideline provides the definitions and guidance for the purposes of reporting performance indicator data. No other documents should be used for definitions or guidance unless specifically referenced in this document. This guideline should not be used for purposes other than collection and reporting of performance indicator data in the NRC licensee assessment process.

Background

In 1998 and 1999, the NRC conducted a series of public meetings to develop a more objective process for assessing a licensee's regulatory and safety performance. The new process uses risk-informed insights to focus on those matters that are of safety significance. The objective is to monitor performance in three broad areas – reactor safety (avoiding accidents and reducing the consequences of accidents if they occur); radiation safety for plant workers and the public during routine operations; and protection of the plant against sabotage or other security threats.

The three broad areas are divided into cornerstones: initiating events, mitigating systems, barrier integrity, emergency preparedness, public radiation safety, occupational radiation safety and physical protection. Performance indicators are used to assess licensee performance in each cornerstones. The NRC will use a risk-informed baseline inspection process to supplement and complement the performance indicator(s). This guideline focuses on the performance indicator segment of the assessment process.

The thresholds for each performance indicator provide objective indication of the need to modify NRC inspection resources or to take other regulatory actions based on licensee performance. Table 1 provides a summary of the performance indicators and their associated thresholds.

The overall objectives of the process are to:

- improve the objectivity of the oversight processes so that subjective decisions and judgment are not central process features,

- improve the scrutability of the NRC assessment process so that NRC actions have a clear tie to licensee performance, and

- risk-inform the regulatory assessment process so that NRC and licensee resources are focused on those aspects of performance having the greatest impact on safe plant operation.

In identifying those aspects of licensee performance that are important to the NRC's mission, adequate protection of public health and safety, the NRC set high level performance goals for regulatory oversight. These goals are:

- maintain a low frequency of events that could lead to a nuclear reactor accident;
- zero significant radiation exposures resulting from civilian nuclear reactors;
- no increase in the number of offsite releases of radioactive material from civilian nuclear reactors that exceed 10 CFR Part 20 limits; and
- no substantiated breakdown of physical protection that significantly weakens protection against radiological sabotage, theft, or diversion of special nuclear materials.

These performance goals are represented in the new assessment framework as the strategic performance areas of Reactor Safety, Radiation Safety, and Safeguards.

Figure 1.0 provides a graphical representation of the licensee assessment process.

General Reporting Guidance

At quarterly intervals, each licensee will submit to the NRC the performance assessment data described in this guideline. The data is submitted electronically to the NRC by the **21st** calendar day of the month following the end of the reporting quarter. The format and examples of the data provided in each subsection show the complete data record for an indicator, and provide a chart of the indicator. These are provided for illustrative purposes only. Each licensee only sends to the NRC the data set from the previous quarter, as defined in each *Data Reporting Elements* subsection (See Appendix B) along with any changes to previously submitted data.

The reporting of performance indicators is a separate and distinct function from other NRC reporting requirements. Licensees will continue to submit other regulatory reports as required by regulations; such as, 10 CFR 50.72 and 10 CFR 50.73.

Performance indicator reports are submitted to the NRC for each power reactor unit. Some indicators are based on station parameters. In these cases the station value is reported for each power reactor unit at the station.

Issues regarding interpretation or implementation of NEI 99-02 guidance may occur during initial implementation. Licensees are encouraged to resolve these issues with the Region. In those instances where the NRC staff and the Licensee are unable to reach resolution, the issue should be escalated to appropriate industry and NRC management using the FAQ process. In the interim period until the issue is resolved, the Licensee is encouraged to maintain open communication with the NRC. Issues involving enforcement are not included in this process.

If a performance indicator data reporting error is discovered, an amended "mid-quarter" report does not need to be submitted if both the previously reported and amended performance indicator values are within the "green" performance indicator band. In these instances, corrected data should be included in the next quarterly report along with a brief description of the reason for the change(s). If a performance indicator data error is discovered that causes a threshold to be crossed, a "mid-quarter" report should be submitted as soon as practical following discovery of the error.

In instances where a newly identified faulted condition is determined to have occurred in a previous reporting period, previously submitted indicator data are amended only to the extent necessary to correctly calculate the indicators for the current reporting period. The current report should reflect the new information, as discussed in the detailed sections of this document. In these cases, the quarterly data report should include a comment to indicate that the indicator values for past reporting periods are different than previously reported. If available at the time of the report, the LER reference is noted.

The quarterly report allows comments to be included with performance indicator data. A general comment field is provided for comments pertinent to the quarterly submittal that are not specific to an individual performance indicator. A separate comment field is provided for each performance indicator. Comments included in the report should be brief and understandable by the general public. Comments provided as part of the quarterly report will be included along with performance indicator data as part of the NRC Public Web site on the oversight program. **If multiple PI comments are received by NRC that are applicable to the same unit/PI/quarter, the NRC Public Web site will display all applicable comments for the quarter in the order received (e.g., If a comment for the current quarter is received via quarterly report and a comment for the same PI is received via a change report, then both comments will be displayed on the Web site. For General Comments, the NRC Public Web site will display only the latest "general" comment received for the current quarter (e.g., A "general" comment received via a change report will replace any "general" comment provided via a previously submitted quarterly report.)**

Comments should be generally limited to instances as directed in this guideline. These instances include:

- Exceedance of a threshold (Comment should include a brief explanation and should be repeated in subsequent quarterly reports as necessary to address the threshold exceedance)
- Revision to previously submitted data (Comment should include a brief characterization of the change, should identify affected time periods and should identify whether the change affects the "color" of the indicator.)
- Identification of a design deficiency affecting safety system unavailability (See Safety System Unavailability discussion on fault exposure unavailable hours)
- Resetting of fault exposure hours (See Safety System Unavailability discussion on resetting fault exposure hours)
- Unavailability of data for quarterly report (Examples include unavailability of RCS Activity data for one or more months due to plant conditions that do not require RCS activity to be calculated.)

In specific circumstances, some plants, because of unique design characteristics, may typically appear in the "increased regulatory response band," as shown in Table 1. In such cases the unique condition and the resulting impact on the specific indicator should be explained in the associated comment field. Additional guidance is provided under the appropriate indicator sections.

The quarterly data reports are submitted to the NRC under 10 CFR 50.4 requirements. The quarterly reports are to be submitted in electronic form only. Separate submittal of a paper copy is not requested. Licensees should apply standard commercial quality practices to provide reasonable assurance that the quarterly data submittals are correct. Licensees should plan to retain the data consistent with the historical data requirements for each performance indicator. For example, data associated with the barrier cornerstone should be retained for 12 months, data for safety system unavailability should be retained for 12 quarters.

The criterion for reporting is based on the time the failure or deficiency is identified, with the exception of the Safety System Functional Failure indicator, which is based on the Report Date of the LER. In some cases the time of failure is immediately known, in other cases there may be a time-lapse while calculations are performed to determine whether a deficiency exists, and in some instances the time of occurrence is not known and has to be estimated. Additional clarification is provided in specific indicator sections.

Applicability of NEI 99-02 Revision 0

The guidance provided in Revision 0 to NEI 99-02 is to be applied on a forward fit basis and should be utilized in the preparation and submittal of performance indicator data for 2nd quarter 2000 and beyond. Guidance contained in NEI 99-02 Draft Revision D or NEI 99-02 Revision 0 should be utilized for 1st quarter 2000 data. Performance indicator data submitted prior to the issuance of Revision 0 of this guideline (i.e., data collected and submitted using guidance in a previous version of NEI 99-02) may be revised and resubmitted to reflect current guidance if desired. However, revisions of previously submitted data that are the result of changes to guidance alone, are not required. Performance indicator data collections and submittals that supported the January 2000 data submittal were performed as a "best effort" to collect and report historical data. The guidance contained in Draft Revision D of NEI 99-02, relative to the "best effort" collection and reporting of historical data, continues to apply to the data submitted in January 2000.

Numerical Reporting Criteria

Final calculations are rounded up or down to the same number of significant figures as shown in Table 1. Where required, percentages are reported and noted as: 9.0%, 25%.

Submittal of Performance Indicator Data

Performance indicator data should be submitted as a delimited text file (data stream) for each unit, attached to an email addressed to pidata@nrc.gov. The structure and format of the delimited text files is discussed in Appendix B. The email message can include report files containing PI data for the quarter (quarterly reports) for all units at a site and can also include any report file(s) providing changes to previously submitted data (change reports). The title/subject of the email should indicate the unit(s) for which data is included, the applicable quarter, and whether the attachment includes quarterly report(s)

(QR), change report(s) (CR) or both. The recommended format of the email message title line is "<Plant Name(s)>-<quarter/year>-PI Data Elements (QR and/or CR)" (e.g., "Salem Units 1 and 2 – 1Q2000 – PI Data Elements (QR)"). Licensees should not submit hard copies of the PI data submittal (with the possible exception of a back up if the email system is unavailable).

The NRC will send return emails with the licensee's submittal attached to confirm and authenticate receipt of the proper data, generally within 2 business days. The licensee is responsible for ensuring that the submitted data is received without corruption by comparing the response file with the original file. Any problems with the data transmittal should be identified in an email to pidata@nrc.gov within 4 business days of the original data transmittal.

Additional guidance on the collection of performance indicator data and the creation of quarterly reports and change reports is provided at the NEI performance indicator website (PIWeb).

The reports made to the NRC under the new regulatory assessment process are in addition to the standard reporting requirements prescribed by NRC regulations.

Frequently Asked Questions

Frequently Asked Questions (FAQ) and responses regarding interpretations of this guideline are provided within the FAQ subsections of this guideline for FAQs specific to a performance indicator and as part of Appendix C for FAQs that are not specific to a particular performance indicator. FAQs that receive NRC approval between guideline revisions will be posted on the NRC Website (www.nrc.gov). The FAQs provided in this guideline as well as FAQs posted on the NRC Website represent approved interpretations of performance indicator guidance and should be treated as an adjunct extension of NEI 99-02.

The NRC Website will identify the date of original posting for FAQs and responses. Unless otherwise directed in an FAQ response, FAQs are to be applied to the data submittal for the quarter in which the FAQ was posted and beyond. For example, an FAQ with a posting date of 3/31/2000 would apply to 1st quarter 2000 PI data, submitted in April 2000 and subsequent data submittals. However, an FAQ with a posting date of 4/1/2000 would apply on a forward fit basis to 2nd quarter 2000 PI data submitted in July 2000. Licensees are encouraged to check the NRC Web site frequently, particularly at the end of the reporting period, for FAQs that may have applicability for their sites.

Questions on this guideline may be submitted by email to pihelp@nei.org. The email should include "FAQ" as part of the subject line. The emails should also provide the question and a proposed answer as well as the name and phone number of a contact person. The proposed question and answer will be reviewed by NEI staff and will be discussed with NRC staff at a public meeting. Once approved by NRC, the accepted response will be posted on the NRC Website and incorporated into this guideline when the next revision is issued (no more frequently than once per quarter).

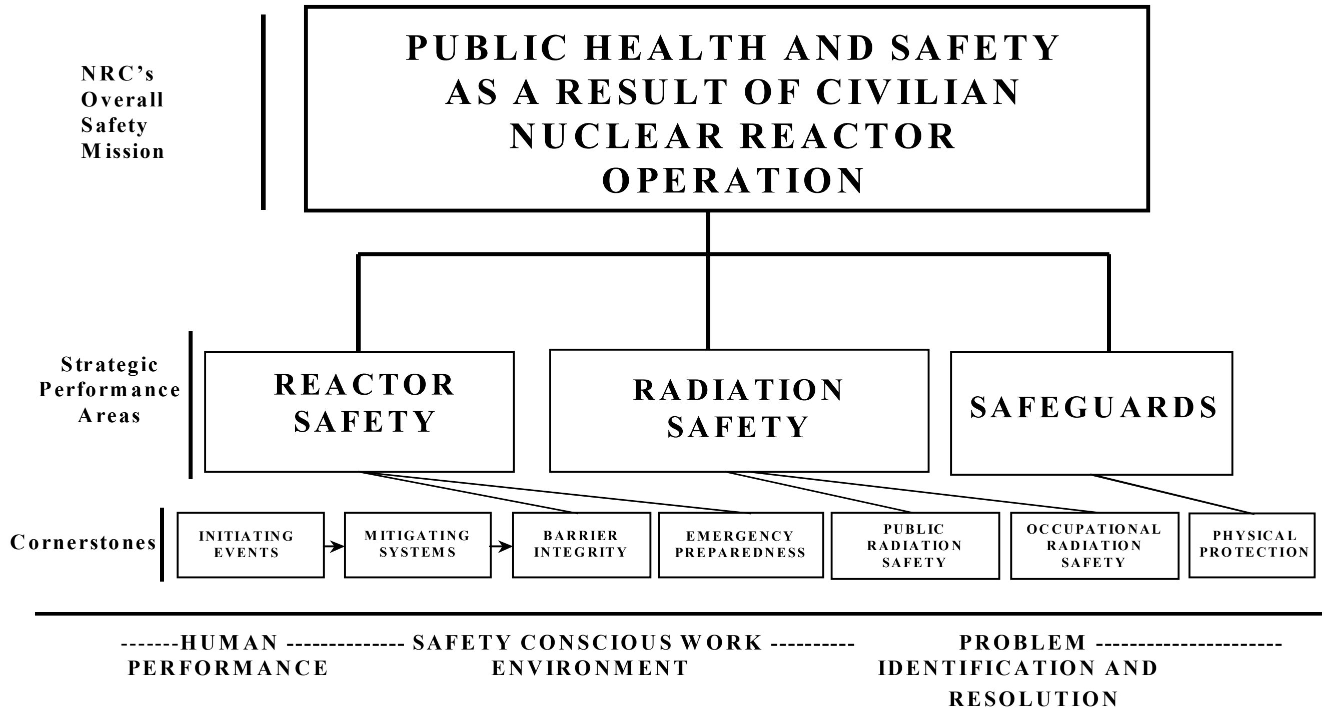


Figure 1 - Regulatory Oversight Framework

Table 1 – PERFORMANCE INDICATORS

Cornerstone	**Indicator**		**Thresholds (see Note 1)** **Increased Regulatory Response Band**	 **Required Regulatory Response Band**	 **Unacceptable Performance Band**
Initiating Events	Unplanned Scrams per 7000 Critical Hours (automatic and manual scrams during the previous four quarters)		>3.0	>6.0	>25.0
	Scrams with a Loss of Normal Heat Removal (over the previous 12 quarters)		>**2.0**	>10.0	>20.0
	Unplanned Power Changes per 7000 Critical Hours (over previous four quarters)		>**6.0**	N/A	N/A
Mitigating Systems	Safety System Unavailability (SSU) (average of previous 12 quarters)	**All Plants**			
		≤2EDG	>**2.5**%	>5.0%	>10.0%
		>2EDG	>**2.5**%	>10.0%	>20.0%
		Hydro Emerg. Power	**TBD**	**TBD**	**TBD**
		BWRs			
		HPCI	>4.0%	>12.0%	>50.0%
		HPCS	>1.5%	>4.0%	>20.0%
		RCIC	>4.0%	>12.0%	>50.0%
		RHR	>**1.5**%	>5.0%	>10.0%
		PWRs			
		HPSI	>**1.5**%	>5.0%	>10.0%
		AFW	>2.0%	>6.0%	>12.0%
		RHR	>**1.5**%	>5.0%	>10.0%
	Safety System Functional Failures (over previous four quarters)	**BWRs** PWRs	>**6.0** >5.0	N/A N/A	N/A N/A

Note 1: Thresholds that are specific to a site or unit will be provided in Appendix D when identified.

Table 1 - PERFORMANCE INDICATORS Cont'd

Cornerstone	Indicator	Thresholds (see Note 1)		
		Increased Regulatory Response Band	**Required Regulatory Response Band**	**Unacceptable Performance Band**
Barriers Fuel Cladding	Reactor Coolant System (RCS) Specific Activity (maximum monthly values, percent of Tech. Spec limit, during previous four quarters)	>50.0%	>100.0%	N/A
Reactor Coolant System	RCS Identified Leak Rate (maximum monthly values, percent of Tech. Spec. limit, during previous four quarters)	>50.0%	>100.0%	N/A
Emergency Preparedness	Drill/Exercise Performance (over previous eight quarters)	<90.0%	<70.0%	N/A
	ERO Drill Participation (percentage of Key ERO personnel that have participated in a drill or exercise in the previous eight quarters)	<80.0%	<60.0%	N/A
	Alert and Notification System Reliability (percentage reliability during previous four quarters)	<94.0%	<90.0%	N/A
Occupational Radiation Safety	Occupational Exposure Control Effectiveness (occurrences during previous 4 quarters)	>2	>5	N/A
Public Radiation Safety	RETS/ODCM Radiological Effluent Occurrence (occurrences during previous four quarters)	>1	>3	N/A
Physical Protection	Protected Area Security Equipment Performance Index (over a four quarter period)	>0.080	N/A	N/A
	Personnel Screening Program Performance (reportable events during the previous four quarters)	>2	>5	N/A
	Fitness-for-Duty (FFD)/Personnel Reliability Program Performance (reportable events during the previous four quarters)	>2	>5	N/A

Note 1: Thresholds that are specific to a site or unit will be provided in Appendix D when identified.

2 PERFORMANCE INDICATORS

2.1 INITIATING EVENTS CORNERSTONE

The objective of this cornerstone is to limit the frequency of those events that upset plant stability and challenge critical safety functions, during shutdown[1] as well as power operations. If not properly mitigated, and if multiple barriers are breached, a reactor accident could result which may compromise the public health and safety. Licensees can reduce the likelihood of a reactor accident by maintaining a low frequency of these initiating events. Such events include reactor scrams due to turbine trips, loss of feedwater, loss of off-site power, and other significant reactor transients.

The indicators for this cornerstone are reported and calculated per reactor unit.

There are three indicators in this cornerstone:

- Unplanned (automatic and manual) scrams per 7,000 critical hours
- Scrams with a loss of normal heat removal per 12 quarters
- Unplanned Power Changes per 7,000 critical hours

UNPLANNED SCRAMS PER 7,000 CRITICAL HOURS

Purpose

This indicator monitors the number of unplanned scrams. It measures the rate of scrams per year of operation at power and provides an indication of initiating event frequency.

Indicator Definition

The number of unplanned scrams during the previous four quarters, both manual and automatic, while critical per 7,000 hours[2].

Data Reporting Elements

The following data is reported for each reactor unit:

- the number of unplanned automatic and manual scrams while critical in the previous quarter

- the number of hours of critical operation in the previous quarter

[1]Shutdown indicators are being developed and will be included in later revisions.
[2] The transient rate is calculated per 7,000 critical hours because that value is representative of the critical hours of operation in a year for a typical plant.

Calculation

The indicator is determined using the values for the previous four quarters as follows:

$$\text{value} = \frac{(\text{total unplanned scrams while critical in the previous 4 qtrs}) \times 7{,}000 \text{ hrs}}{(\text{total number of hours critical in the previous 4 qtrs})}$$

Definition of Terms

Scram means the shutdown of the reactor by the rapid addition of negative reactivity by any means, e.g., insertion of control rods, boron, use of diverse scram switch, or opening reactor trip breakers.

Unplanned scram means that the scram was not an intentional part of a planned evolution or test as directed by a normal operating or test procedure. This includes scrams that occurred during the execution of procedures in which there was a high chance of a scram occurring but the scram was not intended.

Criticality, for the purposes of this indicator, typically exists when a licensed reactor operator declares the reactor critical. There may be instances where a transient initiates from a subcritical condition and is terminated by a scram after the reactor is critical—this condition would count as a scram.

Clarifying Notes

The value of 7,000 hours is used because it represents one year of reactor operation at an 80.0% capacity factor.

If there are fewer than 2,400 critical hours in the previous four quarters the indicator value is computed as N/A because rate indicators can produce misleadingly high values when the denominator is small. The data elements (unplanned scrams and critical hours) are still reported.

Dropped rods, single rod scrams, or half scrams are not considered reactor scrams.

Anticipatory plant shutdowns intended to reduce the impact of external events, such as tornadoes or range fires threatening offsite power transmission lines, are excluded.

Examples of the types of scrams that **are included**:

- Scrams that resulted from unplanned transients, equipment failures, spurious signals, human error, or those directed by abnormal, emergency, or annunciator response procedures.

- A scram that is initiated to avoid exceeding a technical specification action statement time limit.

- **A scram that occurs during the execution of a procedure or evolution in which there is a high likelihood of a scram occurring but the scram was neither planned nor intended.**

Examples of scrams that **are not** included:

- Scrams that are planned to occur as part of a test (e.g., a reactor protection system actuation test), or scrams that are part of a normal planned operation or evolution.

- Reactor protection system actuation signals that occur while the reactor is sub-critical.

- Scrams that occur as part of the normal sequence of a planned shutdown and scram signals that occur while the reactor is shut down.

Frequently Asked Questions

ID Question

5 The Clarifying Notes for the Unplanned Scrams per 7000hrs PI state that scrams that are included are: scrams "that resulted from unplanned transients...." and a "scram that is initiated to avoid exceeding a technical specification action statement time limit;" and, scrams that are not included are "scrams that are part of a normal planned operation or evolution" and, scrams "that occur as part of the normal sequence of a planned shutdown..." If a licensee enters an LCO requiring the plant to be in Mode 2 within 7 hours, applies a standing operational procedure for assuring the LCO is met, and a manual scram is executed in accordance with that procedure, is this event counted as an unplanned scram?

Response

If the plant shutdown to comply with the Technical Specification LCO, was conducted in accordance with the normal plant shutdown procedure, which includes a manual scram to complete the shutdown, the scram would not be counted as an unplanned scram. However, the power reduction would be counted as an unplanned transient (assuming the shutdown resulted in a power change greater than 20%).However, if the actions to meet the Technical Specification LCO required a manual scram outside of the normal plant shutdown procedure, then the scram would be counted as an unplanned scram.

ID **Question**

159 **With the Unit in Operational Condition 2 (Startup) a shutdown was ordered due to an insufficient number of operable Intermediate Range Monitors (IRM). The reactor was critical at 0% power. "B" and "D" IRM detectors failed, and a plant shutdown was ordered. The manual scram was inserted in accordance with the normal shutdown procedure. Should this count as an unplanned reactor scram?**

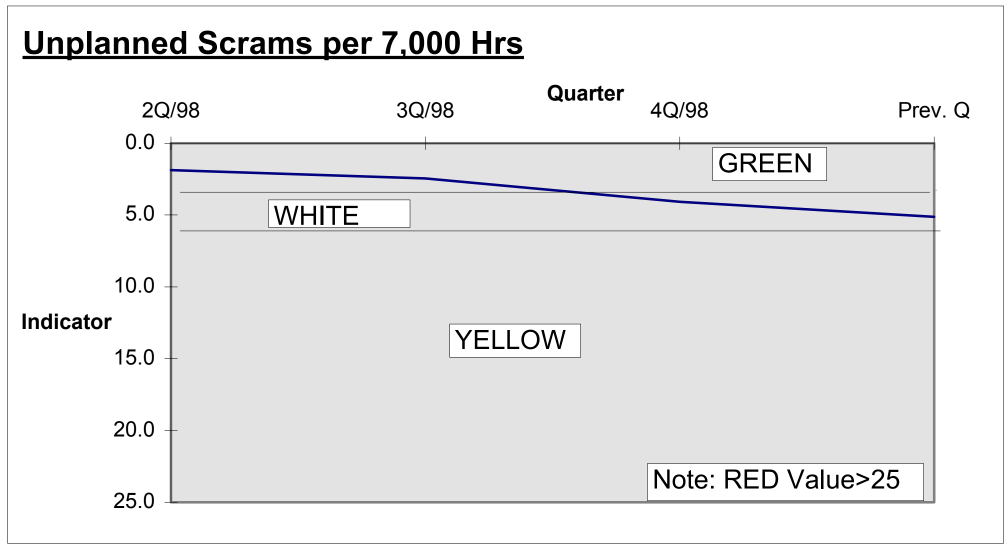
Response

No. If part of a normal shutdown, (plant was following normal shut down procedure) the scram would not count.

Data Example

Unplanned Scrams per 7,000 Critical Hours									
	2Q/97	**3Q/97**	**4Q/97**	**1Q/98**	**2Q/98**	**3Q/98**	**4Q/98**	**Prev. Qtr**	
# of Scrams critical in qtr	1	0	0	1	1	1	2	2	
Total Scrams over 4 qtrs				2	2	3	5	6	
# of Hrs Critical in qtr	1500	1000	2160	2136	2160	2136	2136	1751	
Total Hrs Critical in 4 qtrs				6796	7456	8592	8568	8183	
					2Q/98	**3Q/98**	**4Q/98**	**Prev. Q**	
Indicator value					1.9	2.4	4.1	5.1	

Thresholds	
Green	≤3.0
White	>3.0
Yellow	>6.0
Red	>25.0



SCRAMS WITH A LOSS OF NORMAL HEAT REMOVAL

Purpose

This indicator monitors that subset of unplanned and planned automatic and manual scrams that necessitate the **use** of mitigating systems and are therefore more risk-significant than uncomplicated scrams.

Indicator Definition

The number of unplanned and planned scrams while critical, both manual and automatic, during the previous 12 quarters that also involved a loss of the normal heat removal path through the main condenser **prior to establishing reactor conditions that allow use of the plant's normal long term heat removal systems**.

Data Reporting Elements

The following data is reported for each reactor unit:

- the number of planned and unplanned automatic and manual scrams while critical in the previous quarter in which the normal heat removal path through the main condenser was lost **prior to establishing reactor conditions that allow use of the plant's normal long term heat removal systems**

Calculation

The indicator is determined using the values reported for the previous 12 quarters as follows:

value = total scrams while critical in the previous 12 quarters in which the normal heat removal path through the main condenser was lost **prior to establishing reactor conditions that allow use of the plant's normal long term heat removal systems.**

Definition of Terms

Loss of normal heat removal path: decay heat cannot be removed through the main condenser when any of the following conditions occur:

- loss of main feedwater
- loss of main condenser vacuum
- closure of main steam isolation valves
- loss of turbine bypass capability

Scram means the shutdown of the reactor by the rapid addition of negative reactivity by any means, e.g., insertion of control rods, boron, use of diverse scram switch, or opening reactor trip breakers.

Criticality, for the purposes of this indicator, typically exists when a licensed reactor operator declares the reactor critical. There may be instances where a transient initiates from a subcritical condition and is terminated by a scram after the reactor is critical—this condition would count as a scram.

Clarifying Notes

Intentional operator actions to control the reactor cooldown rate, such as securing main feedwater or closing the MSIVs, are not counted in this indicator.

Design features to limit the reactor cooldown rate, such as closing the main feedwater valves on a reactor scram, are not counted in this indicator.

Partial losses of condenser vacuum in which sufficient capability remains to remove decay heat are not counted in this indicator.

This indicator includes planned and unplanned scrams. Unplanned scrams counted for this indicator are also counted for the *Unplanned Scrams per 7000 Critical Hours* indicator.

Scrams with loss of normal heat removal at low power within the capability of the PORVs are not counted if the main condenser has not yet been placed in service, or has been removed from service.

Momentary operations of PORVs or safety relief valves are not counted as part of this indicator.

Frequently Asked Questions

ID	**Question**
4	The NEI 99-02 instructions for Scrams With Loss of Normal Heat Removal (LONHR) equate LONHR with "loss of main feedwater." At some plants the feedwater pumps trip on high reactor water level, which normally occurs on most scrams. To prevent the feedwater pumps from tripping on a scram, the operator has to quickly take manual control of level. Since the operators often have more important concerns during a scram (e.g., trying to figure out what happened, verifying all the rods are in, etc.) they have been instructed (correctly) to let the pumps trip. When this occurs steam continues to flow to the condenser and make up to the reactor is accomplished using other means (e.g., CRD pumps). Does this count as a hit against the LONHR indicator?
	Response
	In this instance, because the system actions and operator response for this plant are normal expected actions following a scram, this would not count against the LONHR indicator.

ID	**Question**
65	<u>Scrams with a Loss of Normal Heat Removal</u> Does the Scrams with a Loss of Normal Heat Removal PI include main condenser perturbations that result in scrams. For example, if a scram occurs due to a partial or total loss of main feedwater and then, as expected, main feedwater is isolated as part of the plant design following the scram, does this count as a Scram with a Loss of Normal Heat Removal. Similarly, do scrams that occur due to a partial loss of condenser vacuum affect this PI.

Response
The PI is monitoring the use of alternate means of decay heat removal following a scram. Therefore, the described feedwater scenario would not be included in the PI. Similarly, a partial loss of condenser vacuum that results in a scram yet provides adequate decay heat removal following the scram would not be included in the PI.

ID **Question**

142 **Under the "Scram with Loss of Normal Heat Removal" performance indicator in NEI 99-02 Draft D, the Definition of Terms states that a "loss of normal heat removal path" has occurred whenever any of the following conditions occur:**

- **loss of main feedwater**
- **loss of main condenser vacuum**
- **closure of main steam isolation valves**
- **loss of turbine bypass capability**

The purpose of the indicator is to count scrams that require the use of mitigating systems, however, instances that meet the above criteria in a literal sense could occur without the necessity of using mitigating systems.

For example, a short term loss of main feedwater injection capability due to pump trip on high reactor water level post-scram is a common BWR event. Under these conditions, there is ample time to restart the main feed pumps before addition of water to the vessel via HPCI or RCIC is required.

A second example would be a case where the turbine bypass valves (also commonly called steam dump valves) themselves are unavailable, but sufficient steam flow path to the main condenser exists via alternate paths (such as steam line drains, feed pump turbine exhausts, etc.) such that no mitigating systems are called upon.

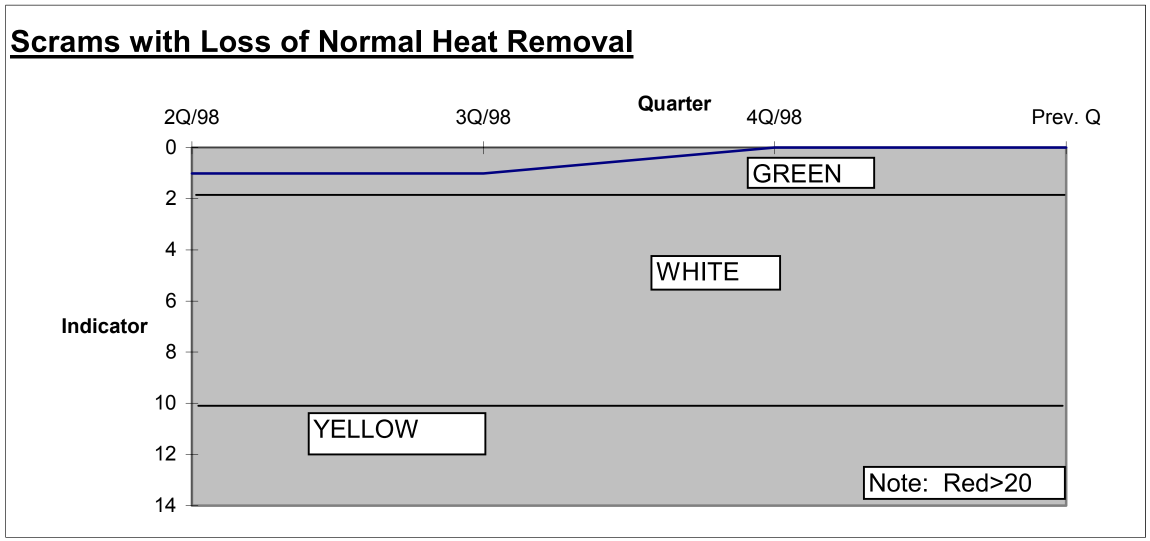
Response
If an alternate heat removal system is put into use, it counts toward the performance indicator.

Data Examples

Scrams with Loss of Normal Heat Removal

	3Q/95	4Q/95	1Q/96	2Q/96	3Q/96	4Q/96	1Q/97	2Q/97	3Q/97	4Q/97	1Q/98	2Q/98	3Q/98	4Q/98	Prev. Qrtr
# of Scrams with loss of Normal	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Heat Sink in previous quarter															
Total Scrams over 12 qtrs												1	1	0	0
												2Q/98	3Q/98	4Q/98	Prev. Q
Indicator value												1	1	0	0

Thresholds	
Green	≤2.0
White	>2.0
Yellow	>10.0
Red	>20.0



UNPLANNED POWER CHANGES PER 7,000 CRITICAL HOURS

Purpose

This indicator monitors the number of unplanned power changes (excluding scrams) that could have, under other plant conditions, challenged safety functions. It may provide leading indication of risk-significant events but is not itself risk-significant. The indicator measures the number of plant power changes for a typical year of operation at power.

Indicator Definition

The number of unplanned changes in reactor power of greater than 20% full-power, per 7,000 hours of critical operation excluding manual and automatic scrams.

Data Reporting Elements

The following data is reported for each reactor unit:

- the number of unplanned power changes, excluding scrams, during the previous quarter

- the number of hours of critical operation in the previous quarter

Calculation

The indicator is determined using the values reported for the previous four quarters as follows:

$$\text{value} = \frac{\text{(total number of unplanned power changes over the previous 4 qtrs)}}{\text{total number of hours critical during the previous 4 qtrs}} \times 7{,}000 \text{ hrs}$$

Definition of Terms

Unplanned changes in reactor power are changes in reactor power that are initiated less than 72 hours following the discovery of an off-normal condition, and that result in, or require a change in power level of greater than 20% full power to resolve. Unplanned changes in reactor power also include uncontrolled excursions in reactor power that occur in response to changes in reactor or plant conditions and are not an expected part of a planned evolution or test.

Clarifying Notes

If there are fewer than 2,400 critical hours in the previous four quarters the indicator value is computed as N/A because rate indicators can produce misleadingly high values when the denominator is small. The data elements (unplanned power changes and critical hours) are still reported.

The 72 hour period between discovery of an off-normal condition and the corresponding change in power level is based on the typical time to assess the plant condition, and prepare, review, and approve the necessary work orders, procedures, and necessary safety reviews, to effect a repair. The key element to be used in determining whether a power change should be counted as part of this indicator is the 72 hour period and not the extent of the planning that is performed between the discovery of the condition and initiation of the power change.

Unplanned power changes and shutdowns include those conducted in response to equipment failures or personnel errors and those conducted to perform maintenance. They do not include automatic or manual scrams or load-follow power changes.

Apparent power changes that are determined to be caused by instrumentation problems are not included.

Examples of power changes are runbacks and power oscillations.

Anticipatory power reductions intended to reduce the impact of external events such as hurricanes or range fires threatening offsite power transmission lines, and power changes requested by the system load dispatchers, are excluded.

Frequently Asked Questions

ID	**Question**
1	Preplanned Contingency Power Changes If a reduction from 100% to 70% is planned, and an additional 25% must occur if the situation is worse than expected, can a licensee preplan (at the time of preplanning the 30% reduction) a "second contingency step planning" for the additional 25%. **Response** The 72 hour planning period is used as a mark to indicate that necessary planning has occurred to address the proposed power change. This planning may include contingency power changes that would not be counted toward the performance indicator.

ID	**Question**
2	Overshoot of Planned Power Reduction If a licensee plans to reduce from 100% to 85% (15% reduction) but due to equipment malfunction (boron dilution) overshoots and reduces to 70%. Since 15% was already planned, is the overall transient considered (100-70 = 30% and counted as a "hit"), or is it only for transients beyond that planned (85-70 = 15% and not counted as a "hit")? **Response** The Unplanned Power Changes Performance Indicator addresses changes in reactor power that are not an expected part of a planned evolution or test. In the proposed example, the unplanned portion of the power evolution resulted in a 15% change in power and would not count toward the performance indicator.

ID **Question**

3 Does the 20% power change rule apply to an uncontrolled excursion or are any uncontrolled excursions counted? Our specific example is: Unit 1 experienced an uncontrolled power excursion from 100% to 100.3% due to a high level feed water heater dump valve failure.

Response

The performance indicator counts any unplanned changes in reactor power greater than 20% of full power. In your example, the excursion does not exceed 20% and would thus not be counted under this performance indicator.

ID **Question**

6 Relative to power reductions greater than 20%, the difference between planned versus unplanned maintenance seems to be the 72 hour timeframe. In that context, we may have a situation whereby a main steam relief valve tailpipe temperature sensor is indicating a leak. The temperature is monitored and plans are made for repairs. Because the valve is located inside primary containment (inerted with nitrogen for fire protection reasons) a range of contingencies is prepared, including the replacement of the relief valve. The monitoring continues (days/weeks beyond 72 hours from problem identification) until an administratively established limit for tailpipe temperature is achieved -- at which time a plant shutdown is initiated (power reduction greater than 20%). Would this reduction be counted as an unplanned power reduction greater than 20%? A similar situation could exist for reactor coolant leakage monitoring. We have two types of leakage -- equipment leakage (identified) and floor leakage (unidentified) inside primary containment. The leakage is monitored twice per shift. At some point, indications suggest that a recirculation pump (inside containment) seal is degrading. The indications are flow to the seal and an increase in floor leakage (unidentified). Past experience and the indications conclude the floor leakage is due to recirculation pump seal degradation. Plans are made to replace or repair the seal if administratively established limits are met or exceeded (not Tech Spec). This would require a plant shutdown. The indications are monitored. The indications continue (days/weeks beyond 72 hours from problem identification) until the administrative limit is achieved. A plant shutdown (power reduction greater than 20%). Would this be counted as an unplanned power reduction greater than 20%?

Response

The cases described would not be counted in the unplanned power changes indicator. In both of the cases described, the time period between discovery of an off-normal condition (i.e., main steam relief valve leakage and possible recirculation pump seal degradation) exceeded 72 hours. This allowed for assessment of plant conditions, preparation and review in anticipation of an orderly power reduction and shutdown.

ID **Question**

156 **For a situation where an unplanned runback (greater than 20%) is properly terminated by a trip (since the runback was unable to reduce power rapidly enough), should the event be counted as both an Unplanned Power Change and an Unplanned Scram?**

Response

No.

ID Question

157 Power was reduced on three consecutive days for condenser cleaning, in accordance with established contingency plans for zebra mussel fouling of the main condenser. Should these power reductions count as unplanned power changes, since the 72-hour planning window discussed in NEI 99-02 was not met for each individual reduction?

Response

See response for FAQ 158

ID Question

158 Power changes (reductions) in excess of 20%, while not routinely initiated, are not uncommon during summer hot weather conditions when conducting the standard condenser backwashing evolution for our once though, salt water cooled plant. While it is known that backwashing will be performed multiple times a week during warm weather months (and less frequently during colder months), the specific timing of any individual backwash is not predictable 72 hours in advance as the accumulation of marine debris and the growth rate of biological contaminants drives the actual initiation of each evolution. The main condenser system was specifically designed to allow periodic cleaning by backwash which is procedurally controlled to assure sufficient vacuum is maintained. It is sometimes necessary, due to high inlet temperatures, to reduce power more than 20% to meet procedural requirements during the backwash evolution. Similarly load reductions during very hot weather are sometimes necessary if condenser discharge temperatures approach our NPDES Permit limit. Actual initiation of a power change is not predictable 72 hours in advance as actions are not taken until temperatures actually reach predefined levels. Would power changes in excess of 20% driven by either of these causes be counted for this indicator?

Response

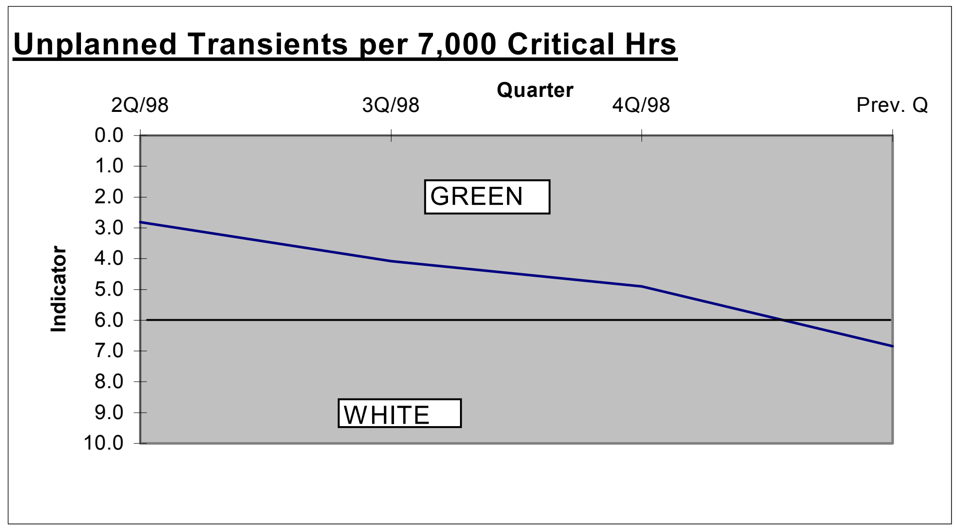
No. If they were anticipated and planned evolutions and not reactive to the sudden discovery of off normal conditions they would not count. The circumstances of each situation are different and should be identified to the NRC so that a determination can be made concerning whether a power change is counted.

Data Example

Unplanned Power Changes per 7,000 Critical Hours

	2Q/97	3Q/97	4Q/97	1Q/98	2Q/98	3Q/98	4Q/98	Prev. Qtr
# of Power Changes in previous qtr	1	0	0	1	2	2	1	3
Total Power Changes in previous 4 qtrs	1	1	1	2	3	5	6	8
# of Hrs Critical in qrtr	1500	1000	2160	2136	2160	2136	2136	1751
Total Hrs Critical in previous 4 qtrs				6796	7456	8592	8568	8183
					2Q/98	3Q/98	4Q/98	Prev. Q
Indicator value					2.8	4.1	4.9	6.8

Thresholds	
Green	≤6.0
White	>6.0
Yellow	N/A
Red	N/A



2.2 MITIGATING SYSTEMS CORNERSTONE

This section defines the performance indicators used to monitor the performance of key selected systems that are designed to mitigate the effects of initiating events, and describes their calculational methods.

The definitions and guidance contained in this section, while similar to guidance developed in support of INPO/WANO indicators and the Maintenance Rule, are unique to the regulatory oversight program. Differences in definitions and guidance in most instances are deliberate and are necessary to meet the unique requirements of the regulatory oversight program.

While safety systems are generally thought of as those that are designed to mitigate design basis accidents, not all mitigating systems have the same risk importance. PRAs have shown that risk is often influenced not only by front-line mitigating systems, but also by support systems and equipment. Such systems and equipment, both safety- and non-safety related, have been considered in selecting the performance indicators for this cornerstone. Not all aspects of licensee performance can be monitored by performance indicators, and risk-informed baseline inspections are used to supplement these indicators.

SAFETY SYSTEM UNAVAILABILITY

Purpose

The purpose of the safety system unavailability indicator is to monitor the readiness of important safety systems to perform their safety functions in response to off-normal events or accidents.

Indicator Definition

The average of the individual train unavailabilities in the system. Train unavailability is the ratio of the hours the train is unavailable to the number of hours the train is required to be able to perform its intended safety function.

The performance indicator is calculated separately for each of the following four systems for each reactor type.

BWRs

- high pressure injection systems -- (high pressure coolant injection, high pressure core spray, feedwater coolant injection)
- heat removal systems - (reactor core isolation cooling)
- residual heat removal system
- emergency AC power system

PWRs

- high pressure safety injection system
- auxiliary feedwater system
- emergency AC power system
- residual heat removal system

Data Reporting Elements

The following elements are reported for each train for the previous quarter:

- planned unavailable hours,
- unplanned unavailable hours,
- fault exposure unavailable hours, and
- hours the train was required to be available for service.
- number of trains in the system

Sources for identifying unavailable hours can be obtained from system failure records, control room logs, event reports, maintenance work orders, etc. Preventive maintenance and surveillance test procedures may be helpful in determining if activities performed using these procedures cause systems or trains to be unavailable. These procedures may also assist in identifying the frequency of such maintenance and test activities.

Calculation

The system unavailability is determined for each reporting quarter as follows:

Train unavailability during previous 12 quarters:

$$\frac{(\text{planned unavailable hrs}) + (\text{unplanned unavailable hrs}) + (\text{fault exposure unavailable hrs})}{(\text{hours train required during the previous 12 quarters})}$$

System unavailability is the sum of the train unavailabilities divided by the number of system trains.

The indicator for each of the monitored systems is the average system unavailability over the previous 12 quarters.

For some multi-unit stations the calculation for the emergency diesel generator value could be affected by a “swing” emergency diesel generator for either unit or other units. (See Emergency AC Power section for further details.)

Definition of Terms

Planned unavailable hours: These hours include time the train was out of service for maintenance, testing, equipment modification, or any other time equipment is electively removed from service and the activity is planned in advance.

Unplanned unavailable hours: These hours include corrective maintenance time or elapsed time between the discovery and the restoration to service of an equipment failure or human error that makes the train unavailable (such as a misalignment).

Fault exposure unavailable hours: These are estimated hours that a train was in an undetected, failed condition. (This item is explained in more detail in the Clarifying Notes.)

Hours required are the number of hours a monitored safety system is required to be available to satisfactorily perform its intended safety function.

A train consists of a group of components that together provide the monitored functions of the system and as explained in the enclosures for specific reactor types. Fulfilling the design basis of the system may require one or more trains of a system to operate simultaneously. The number of trains in a system is determined as follows:

- for systems that primarily pump fluids, the number of trains is equal to the number of parallel pumps or the number of flow paths in the flow system (e.g., number of auxiliary feedwater pumps). The preferred method is to use the number of pumps. For a system that contains an installed spare pump, the number of trains would equal the number of flow paths in the system.

- for systems that provide cooling of fluids, the number of trains is determined by the number of parallel heat exchangers, or the number of parallel pumps, whichever is fewer.

- emergency AC power system: the number of class 1E emergency (diesel, gas turbine, or hydroelectric) generators at the station that are installed to power shutdown loads in the event of a loss of off-site power -- This includes the diesel generator dedicated to the BWR HPCS system.

Note: Additional guidance for specific systems is provided later in this section.

Clarifying Notes

The systems have been selected for this indicator based on their importance in preventing reactor core damage or extended plant outage. The selected systems include the principal systems needed for maintaining reactor coolant inventory following a loss of coolant, for decay heat removal following a reactor trip or loss of main feedwater, and for providing emergency AC power following a loss of plant off-site power.

Except as specifically stated in the indicator definition and reporting guidance, no attempt is made to monitor or give credit in the indicator results for the presence of other systems at a given plant that add diversity to the mitigation or prevention of accidents. For example, no credit is given for additional power sources that add to the reliability of the electrical grid supplying a plant because the purpose of the indicator is to monitor the effectiveness of the plant's response once the grid is lost.

Some components in a system may be common to more than one train, in which case the effect of the performance (unavailable hours) of a common component is included in all affected trains.

Planned Unavailable Hours

Planned unavailable hours are hours that a train is not available for service for an activity that is planned in advance. The beginning and ending times of planned unavailable hours are known.[3] Causes of planned unavailable hours include, but are not limited to, the following:

- preventive maintenance, corrective maintenance on non-failed trains, or inspection requiring a train to be mechanically and/or electrically removed from service

- planned support system unavailability causing a train of a monitored system to be unavailable (e.g., AC or DC power, instrument air, service water, component cooling water, or room cooling)

- **testing, unless the test configuration is automatically overridden by a valid starting signal, or the function can be promptly restored either by an operator in the control room or by a dedicated operator stationed locally for that purpose. Restoration actions must be contained in a written procedure, must be uncomplicated (*a single action or a few simple actions*), and must not require diagnosis or repair. Credit for a dedicated local operator can be taken only if (s)he is positioned at the proper location throughout the duration of the test for the purpose of restoration of the train should a valid demand occur. The intent of this paragraph is to allow licensees to take credit for restoration actions that are virtually certain to be successful (i.e., probability nearly equal to 1) during accident conditions.**

- any modification that requires the train to be mechanically and/or electrically removed from service.

[3] Accumulation of unavailable hours ends when the train is returned to a normal standby alignment. However, if a subsequent test (e.g., post-maintenance test) shows the train not to be capable of performing its safety function, the time between the return to normal standby alignment and the unsuccessful test is reclassified as unavailable hours.

Plants that perform on-line planned overhaul maintenance (i.e., within approved Technical Specification Allowed Outage Time) do not have to include planned overhaul hours in the unavailable hours for this performance indicator. Non-overhaul planned maintenance hours and all unplanned maintenance hours would be reported as part of this indicator. This exception provides equity in data reporting by acknowledging that plants that do not have a sufficient Allowed Outage Time to perform overhaul maintenance on-line do not report maintenance and overhaul hours performed off-line.

Planned unavailable hours are included because portions of a system are unavailable during these planned activities when the system should be available to perform its intended safety function.

Note: It is recognized that such planned activities can have a net beneficial effect in terms of reducing unplanned unavailability and fault exposure unavailable hours (as discussed further below). If planned activities are well managed and effective, fault exposure unavailable hours and unplanned unavailable hours are minimized.

Unplanned Unavailable Hours

Unplanned unavailable hours are the hours that a train is not available for service for an activity that was not planned in advance. The beginning and ending times of unplanned unavailable hours are known. Causes of unplanned unavailable hours include, but are not limited to, the following:

- corrective maintenance time following detection of a failed component that prevented the train from performing its intended safety function. (The time between failure and detection is counted as fault exposure unavailable hours, as discussed below.)

- unplanned support system unavailability causing a train of a monitored system to be unavailable (e.g., AC or DC power, instrument air, service water, component cooling water, or room cooling)

- human errors leading to train unavailability (e.g., valve or breaker mispositioning-- only the time to restore would be reported as unplanned unavailable hours-- the time between the mispositioning and discovery would be counted as fault exposure unavailable hours as discussed below)

<u>Fault Exposure Unavailable Hours</u>

The concept of fault exposure unavailable hours reflects an estimate of the amount of time that a train spends in an undetected, failed condition. Three situations involving fault exposure unavailable hours can occur.

1. The failure's time of occurrence and its time of discovery are known. Examples of this type of failure include events external to the equipment (e.g., a lightning strike, some mispositioning by operators, or damage caused during test or maintenance activities) that caused the train failure at a known time. For these cases, the fault exposure unavailable hours are the lapsed time between the occurrence of a failure and its time of discovery.

   For instances where the time of occurrence is determined to have occurred more than three years ago (12 quarters) faulted hours are only computed back for a maximum of 12 quarters.

   For design deficiencies that occurred in a previous reporting period, fault exposure hours are not reported. However, unplanned unavailable hours are counted from the time of discovery. The indicator report is annotated to identify the presence of an old design error, and the inspection process will assess the significance of the deficiency.

2. Only the time of the failure's discovery is known with certainty. It is improper to assume that the failure occurred at the time of discovery for these failures because the assumption ignores what could be significant unavailable time prior to their discovery. Fault exposure unavailable hours for this case must be estimated. The value used to estimate the fault exposure unavailable hours for this case is: one half the time since the last successful test or operation that proved the system was capable of performing its safety function. However, the time reported is never greater than three years (12 quarters). For example, if the last successful surveillance test was 24 months ago, then the time reported would be 8760 hours (12 months). If the time since the last test was 74 months, the time reported would be 26,280 hours (36 months).

   Note: For design deficiencies, faulted hours are not counted. However, unplanned hours are counted from the time of discovery. In these cases, the quarterly indicator report is annotated to identify the presence of an ancient design error, and the inspection process will assess the significance of the deficiency.

3. The failure is annunciated when it occurs. For this case, there are no fault exposure unavailable hours because the time of failure is the time of discovery. These failures include the following:

   - failure of a continuously operated component, such as the trip of an operating feedwater pump that is also used to fulfill a monitored system function, such as feedwater coolant injection in some BWRs,

   - failure of a component while in standby that is annunciated in the control room, such as failure of control power circuitry for a monitored system, When a failed or mispositioned component that results in the loss of train function is discovered during an inspection or by incidental observation (without being tested), fault exposure unavailable hours are still reported.

Malfunctions or operating errors that do not prevent a train from being restored to normal operation within 10 minutes, from the control room, and that do not require corrective maintenance, or a significant problem diagnosis, are not counted as failures.

Small oil, water or steam leaks that would not preclude safe operation of the component during an operational demand and would not prevent a train from satisfying its safety function are not counted.

A train is available if it is capable of performing its safety function. For example, if a normally open valve is found failed in the open position, and this is the position required for the train to perform its function, fault exposure unavailable hours would not be counted for the time the valve was in a failed state. However, unplanned unavailable hours would be counted for the repair of the valve, if the repair required the valve to be closed or the line containing the valve to be isolated, and this degraded the full capacity or redundancy of the system.

Fault exposure unavailable hours are not counted for a failure to meet design or technical specifications, if engineering analysis determines the train was capable of performing its safety function during an operational event. For example, if an emergency generator fails to reach rated speed and voltage in the precise time required by technical specifications, the generator is not considered unavailable if the test demonstrated that it would start, load, and run as required in an emergency.

Removing (Resetting) Fault Exposure Hours

Fault exposure hours associated with a single item may be removed **after 4 quarters have elapsed from discovery**, provided the following criteria are met:

1. The fault exposure hours associated with the item are greater than or equal to 336 hours.
2. Corrective actions associated with the item to preclude recurrence of the condition have been completed by the licensee, and
3. Supplemental inspection activities by the NRC have been completed and any resulting open items have been closed out in an inspection report.

Fault exposure hours are removed by submitting a change report that provides a revision to the reported hours for the affected quarter(s). The change report should include a comment to document this action.

Hours Train Required

The term "hours train required" is associated with the hours a train is required to be available to satisfactorily perform its safety function, if required. Unavailable hours are counted only for periods when a train is required to be available for service.

The default values identified below are typical; however, differences may exist in the number of trains required during different modes of operation. The calculational methodology accommodates differences in required train hours in these cases.

- Emergency AC power system. This value is estimated by the number of hours in the reporting period, because emergency generators are normally expected to be available for service during both plant operation and shutdown.

- Residual Heat Removal System, This value is estimated by the number of hours in the reporting period, because the residual heat removal system is required to be available for decay heat removal at all times.

- All other systems. This value is estimated by the number of critical hours during the reporting period, because these systems are usually required to be in service only while the reactor is critical, and for short periods during startup or shutdown. In some cases this value is already provided as part of the calculation, as in unplanned automatic scrams per 7,000 hours critical data.

Component Failures

Unavailable hours (planned, unplanned, and fault exposure) are not reported for the failure of certain ancillary components unless the safety function of a principal component (e.g., pump, valve, emergency generator) is affected in a manner that prevents the train from performing its intended safety function. Such ancillary components include equipment associated with control, protection, and actuation functions; power supplies; lubricating subsystems; etc. For example, if there are three pressure switches arranged in a two-out-of-three logic provide low suction pressure protection for a PWR auxiliary feedwater pump, and one becomes defective, unavailable hours would not be counted because the single failure would not affect operability of the pump.

Installed Spares and Redundant Maintenance Trains

Some power plants have safety systems with extra trains of components to allow preventive maintenance to be carried out with the unit at power without violating the single failure criterion (when applied to the remaining trains). That is, one of the remaining trains may fail, but the system can still achieve its safety function as required by the design basis safety analysis. Such systems are characterized by a large number of trains (usually a minimum of four, but often more).

An "installed spare" is a component (or set of components) that is used as a replacement for other equipment to allow for the removal of equipment from service for preventive or corrective maintenance without violating the single failure criterion. To be an "installed spare," a component must not be required in the design basis safety analysis for the system to perform its safety function.

The following examples will help illustrate the system requirements in order to benefit from this provision:

- A system containing three 50% (flow rate and/or cooling capacity) trains would not meet the requirement since full design flow rate would not be available with one train in maintenance and one train failed (single failure criterion).

- A system with four 50% trains or three 100% trains <u>may</u> meet the criterion, assuming the system design flow rate and cooling requirements can be met during a design basis accident anywhere within the reactor coolant or secondary system boundaries, including unfavorable locations of LOCAs and feedwater line breaks. This statement is not intended to set new design criteria, but rather, to define the level of system redundancy required if reporting of unavailable hours on a redundant train is to be avoided.

Unavailable hours for an installed spare are counted only if the installed spare becomes unavailable while serving as replacement for another component. This includes planned and unplanned unavailable hours, and fault exposure unavailable hours.

Planned unavailable hours (e.g., preventive maintenance) and unplanned unavailable hours (e.g., corrective maintenance) are not counted for a component when that component has been replaced by an installed spare.

In some designs, specific systems have a complete spare train, allowing the total replacement of one train for on-line maintenance, or increased system availability. Systems that have such extra trains generally must meet design bases requirements with one train in maintenance and a single failure of another train.

Trains that are required as backup in case of equipment failure to allow the system to meet redundancy requirements or the single failure criterion (e.g., swing components that automatically align to different trains or units) are not installed spares.

Fault exposure unavailable hours associated with failures are counted, even if the failed train/component is replaced by an installed spare while it is being repaired. For example: a pump in a high pressure safety injection system (that has an installed spare pump) fails its quarterly surveillance test. Unavailable hours reported for this failure would include the time needed to substitute the installed spare pump for the failed pump (unplanned unavailable hours), plus half the time since the last successful surveillance that demonstrated the train/system was capable of performing its safety function, or 36 months whichever is the shortest period.

In systems where there are installed spare components or trains, unavailable hours for the spare component or train are only counted against the replaced component or train. For example, if a system has an installed spare train that is valved into the system, any unavailable hours are counted against the replaced train, not the spare train. Thus, in a three train system that has one installed spare train, the number of trains in the safety system unavailability equation is two. The system unavailability is the sum of the unavailable hours divided by two.

Systems Required to be in Service at All Times

The Emergency AC power system and the residual heat removal RHR system are normally required to be in service at all times. However, planned and unplanned unavailable hours are not reported under certain conditions. The specific conditions for the emergency diesel generator are described in the Emergency Diesel Generator Section. For RHR systems, the conditions are as follows:

- When the reactor is shutdown, those systems or portions of systems that provide shutdown cooling can be removed from service without incurring planned or unplanned unavailable hours under the following conditions:

  - Those portions of the shutdown cooling system associated with one heat exchanger flow path can be taken out of service without incurring planned or unplanned unavailable hours provided the other heat exchanger flow path is available (including at least one pump) and an alternate, **NRC approved** means of removing core decay heat is available. The alternate means of decay heat removal need not be safety-related, but must have been determined to be capable of handling the decay heat load.

  - With fuel still in the reactor vessel, when the decay heat load is so low that forced recirculation for cooling purposes, even on an intermittent basis, is no longer required (ambient losses are enough to offset the decay heat load), any train providing shutdown cooling may be removed from service without incurring planned or unplanned unavailable hours.

  - When the reactor is defueled, any trains providing shutdown cooling may be removed from service without incurring planned or unplanned unavailable hours.

  - When the bulk reactor coolant temperature is less than 200 F, those trains or portions of trains whose sole function is to provide suppression pool cooling **(BWR)** may be removed from service without incurring planned or unplanned unavailable hours.

- When portions of a single train provide both the shutdown cooling and the suppression pool cooling function, the most limiting set of reportability requirements should be used (i.e. unavailable hours and required hours are reported whenever at least one function is required.)

Fault exposure unavailable hours are always counted, even when portions of the system are removed from service as described above.

When the plant is operating, selected components that help provide the shutdown cooling function of the RHR system are <u>normally</u> de-energize or racked out. This does not constitute an unavailable condition for the trains that provide shutdown cooling, unless the de-energized components cannot be placed back into service before the minimum time that the shutdown cooling function would be needed (typically the time required for a plant to complete a rapid cooldown, within maximum established plant cooldown limits, from normal operating conditions).

Support System Unavailability

If the unavailability of a support system causes a train to be unavailable, then the hours the support system was unavailable are counted against the train as either planned or unplanned unavailable hours. Support systems are defined as any system required for the safety system to remain available for service. (The technical specification criteria for determining operability may not apply when determining train unavailability. In these cases, analysis or sound engineering judgment may be used to determine the effect of support system unavailability on the monitored system.)

If the unavailability of a single support system causes a train in more than one of the monitored systems to be unavailable, the hours the support system was unavailable are counted against the affected train in each system. For example, a train outage of 3 hours in a PWR service water system caused the emergency generator, the RHR heat exchanger, the HPSI pump, and the AFW pump associated with that train to be unavailable also. In this case, 3 hours of unavailability would be reported for the associated train in each of the four systems.

If a support system is dedicated to a system and is normally in standby status, it should be included as part of the monitored system scope. In those case, fault exposure unavailable hours caused by a failure in the standby support system that results in a loss of a train function should be reported because of the effect on the monitored system. By contrast, failures of continuously-operating support systems do not contribute to fault exposure unavailable hours in the monitored systems they support.

Unavailable hours are also reported for the unavailability of support systems that maintain required environmental conditions in rooms in which monitored safety system components are located, if the absence of those conditions is determined to have rendered a train unavailable for service at a time it was required to be available.

In some instances, unavailability of a monitored system that is caused by unavailability of a support system used for cooling need not be reported if cooling water from another source can be substituted. Limitations on the source of the cooling water are as follows:

- for monitored fluid systems with components cooled by a support system, where both the monitored and the support system pumps are powered by a class lE (i.e., safety grade or an equivalent) electric power source, cooling water supplied by a pump powered by a normal (non class lE--i.e., non-safety grade) electric power source may be substituted for cooling water supplied by a class lE electric power source, provided that redundancy requirements to accommodate single failure criteria for electric power and cooling water are met. Specifically, unavailable hours must be reported when both trains of a monitored system are being cooled by water provided by a single cooling water pump or by cooling water pumps powered by a single class lE power (safety grade) source.

- for emergency generators, cooling water provided by a pump powered by another class lE (safety grade) power source can be substituted, provided a pump is available that will maintain electrical redundancy requirements such that a single failure cannot cause a loss of both emergency generators.

Emergency AC power is not considered to be a support system. Unavailability of a train because of loss of AC power is counted when both the normal AC power supply and the emergency AC power supply are not available.

Frequently Asked Questions

ID	Question
11	How do you report Fault Exposure unavailability hours when ongoing failure analysis or root cause analysis may identify a specific time of occurrence for the failure? Do you report the unavailability time and fault exposure hours immediately upon discovery or can you report unavailability immediately and defer reporting potential fault exposure hours until completion of the failure analysis.
	Response
	If the time of failure is not known with certainty, then the fault exposure hours should be reported as one half the time since the last successful test or operation that proved the system was capable of performing its safety function. The unavailability hours can be amended in a future report if further analysis identifies the time of failure or determines that the affected train would have been capable of performing its safety function during an operational event.

ID	Question
12	Was it intended or anticipated when developing the guidance that SSCs could be considered operable, yet unavailable? Our plant has performed an Operability Determination that justifies maintaining the SI system operable when an SI flow transmitter is out of service for calibration (Restoration is uncomplicated and can be completed well before the transmitter function is needed). However, under NEI 99-02 guidance the out of service time would be counted under planned unavailability.
	Response
	It is possible for an SSC to be considered operable yet unavailable per guidance in NEI 99-02. The purpose of the safety system unavailability indicator is to monitor the readiness of important safety systems to perform their safety functions in response to off-normal events or accidents. System unavailability due to testing is included in this indicator except when the testing configuration is automatically overridden or the function can be immediately restored. NEI 99-02 provides further guidance. The specifics of your situation should be assessed against this guidance to determine if the calibration time is counted.

ID	Question
13	Is it intended that the operator used in the definition of planned unavailability be a licensed operator or can the restoration actions be accomplished by other qualified plant personnel (e.g., I&C technician)
	Response
	Qualified plant personnel, provided there is a means of communication with the Control Room, can perform the restoration actions.

ID	Question
14	In the guidance for planned unavailable hours it says that restoration actions must be contained in a written procedure, must be uncomplicated (a single action **or a few simple actions**) and must not require diagnosis or repair. Is it acceptable to have a procedure action call for restoration of the transmitter if directed by the control room (when normal transmitter restoration is a skill of craft evolution), or would detailed procedure steps be required (i.e., lift test leads, land wire, etc.). Also, is it intended that for an activity to be uncomplicated, it must involve a single action, or is the definition of uncomplicated dependent on the specific circumstances (e.g., the amount of time available for restoration, the difficulty of the actions regardless of number, etc.).

Response

As stated in the guideline, credit is allowed for restoration actions that are virtually certain to be successful (i.e., probability nearly equal to 1) during accident conditions. Under stressful, chaotic conditions, otherwise simple, multiple actions may not be accomplished with the virtual certainty called for by the guidance (e.g., lift test leads, land wires).

ID	Question
15	The Safety System Unavailability Performance Indicator requests data be provided for the following functions: 1) high pressure injection systems, 2) heat removal systems, 3) residual heat removal systems, and 4) emergency AC power systems. The monitored functions for the RHR system are: Removal of heat from the suppression, and Removal of decay heat from the reactor core during a normal unit shutdown (e.g. for refueling or servicing). Our plant does not have an RHR system. The identified functions are performed by the Low-Pressure Coolant Injection/Containment Cooling Service Water system and the Shutdown Cooling system, What should be reported for this indicator?

Response

It is acknowledged that unique plant configurations can affect performance indicator reporting. The circumstances of each occurrence should be identified as early as possible to the NRC so that a determination can be made as to whether alternate data reporting can be used in place of the data called for in the guidance.

ID	Question
17	Can both RHR Shutdown Cooling subsystems be removed from service without incurring Planned or Unplanned Unavailable Hours provided an alternate method of decay heat removal is verified to be available for each RHR Shutdown Cooling subsystem required to be Operable for the Mitigating Systems / Safety Systems Performance Indicator?

Response

Approved alternate methods for decay heat removal during shutdown cooling may be considered Installed Spares provided the components are not required in the design basis safety analysis for the system to perform its safety function. NEI 99-02 provides additional guidance on Installed Spares and Redundant Maintenance Trains. Unavailability hours for installed spares are to be counted if the installed spare becomes unavailable while serving as a replacement and the hours the installed spare is relied upon will also be included in the calculation's required hours.

ID	Question
18	The Nuclear Service Water (NSW) assured suction supply to Auxiliary Feedwater (AFW) was recently determined to be sufficiently occluded with MIC build-up to be unable to fulfill its function under certain accident scenarios. During a postulated seismic event concurrent with a loss of offsite power (LOOP), the normal seismic condensate suction sources would be assumed to be unavailable. Because of the pressure drop associated with the MIC occlusion, it would be possible to induce a negative pressure at the AFW suction, potentially drawing air into the suction from the postulated secondary side line break. The MIC build-up has since been cleared, and flow testing of the NSW supply is now performed. The NSW piping had not been flow tested as part of the plant's GL 89-13 program until after discovery of this condition, so the fault exposure time of this condition is indeterminate. Under the NEI 99-02 guidelines, how should the fault exposure hours for this condition be addressed?
	Response
	First, an assessment needs to be performed to determine the impact of the MIC build-up on capability of the AFW system to perform its safety functions under all design basis conditions. If the MIC buildup is severe enough to prevent fulfillment of the AFW safety function under design basis accident conditions, then the following guidance would apply. The absence of periodic inspection or testing of portions of a system that is relied upon during design basis accident conditions, would be considered a design deficiency. For design deficiencies that occurred in a previous reporting period, fault exposure hours are not reported. However, unplanned unavailable hours are counted from the time of discovery. The indicator report is annotated to identify the presence of the design deficiency, and the inspection process will assess the significance of the deficiency.

ID	Question
19	If a maintenance activity goes beyond the originally scheduled time frame due to delays in work or additional work items are found during the course of a planned system maintenance outage, are the additional unavailable hours considered planned?
	Response
	Yes**, unless you detect a new failed component that prevented the train from performing its intended safety function.**

ID	Question
20	Do you have to count unavailability time for when test return lines used for surveillance testing are out of service? NEI 99-02 states, This capability is monitored for the injection and recirculation phases of the high pressure system response to an accident condition. Does the term "recirculation" refer to the HPCI system taking water from its suppression pool suction, injecting that water into the vessel, and having that water leak from the vessel through the break back to the suppression pool (as opposed to taking the water from the CST and injecting it)? Or is it intended to refer to the system alignment where the test-return valve is open and HPCI is taking water from the CST or suppression pool and putting the water back to the CST or suppression pool without injecting it into the vessel?
	Response
	The test-return line is not required for availability of the HPCI/RCIC system. The test return line can be out of service without counting HPCI/RCIC as unavailable. The term "recirculation" in this context refers to the recirculation of the water from the suppression pool, into the vessel through the injection line, and back to the suppression pool through the leak.

ID	Question
21	If a load run failure occurs during the time that the EDG is not required to be operable by Tech Specs, is this counted as fault exposure if corrective measures are implemented prior to conditions requiring that same EDG to be made operable? This happens in shutdown conditions whereby one EDG at a time could be electively removed from service. **Response** Fault exposure hours do not need to be counted when an EDG is not required to be operable. When a failure occurs on equipment that is not required to be operable, if the most recent successful test and recovery/correction of the failure are all made inside the window where the equipment is not required available, no faulted hours are recorded. If the most recent successful test occurred when the EDG was required to be operable and discovery/correction of the failure are made during a period when the EDG is not required to be operable, faulted hours are recorded on equipment for that portion of the time that the EDG was required to be operable. No fault exposure hours are recorded for times when the EDG is not required.

ID	Question
70	Planned Activities Is there guidance as to how many hours in advance the activities must be planned to be considered "Planned Unavailable hours"? If not, do we establish our own time limit? **Response** The footnote was removed because it did not apply to this indicator. The guidance for this indicator defines "planned unavailable hours" and "unplanned unavailable hours." The intent is that if equipment is "electively" removed from service it is considered planned maintenance, independent of the number of hours it was planned ahead.

ID	Question
71	RHR Unavailable Hours In regards to the NRC PWR Residual Heat Removal (RHR) Performance Indicator, at our plant the Low Pressure Safety Injection (LPSI) pumps do not contribute to the post accident recirculation function (they receive an auto shutdown signal on a Recirculation signal). Given that, if a LPSI pump or header is taken OOS for maintenance while the unit is at power, should unavailable hours be counted against the train since its only function (normal S/D cooling) is not needed in this mode and there is an extended period of time before the plant would be in condition to begin normal S/D cooling? **Response** If your tech specs do not require your LPSI pumps while at power, then the hours do not count as unavailable for the PI. Make a best faith effort to provide the data and state your assumptions in the comment field.

ID **Question**

73 <u>Planned Unavailable Hours</u>

NEI 99-02, Section 2.2, Mitigating Systems Cornerstone, Safety System Unavailability, Clarifying Notes, under Planned Unavailable Hours: There is a discussion of one cause of planned unavailable hours as testing, unless the testing configuration is automatically overridden by a valid starting signal or the function can be **promptly** restored, either by an operator in the control room or by a dedicated operator stationed locally for that purpose. Restoration actions must be contained in a written procedure, must be uncomplicated (a single action **or a few simple actions**), and must not require diagnosis or repair. Credit for a dedicated operator can be taken only if (s)he is positioned at the proper location throughout the duration of the test for the purpose of restoration of the train should a valid demand occur. A clarification question is: Can we credit an operator in the main control room if the operator is not positioned directly over the piece of equipment, but is in close vicinity to it and can respond to start the equipment? Another clarification question is: As stated above, restoration actions must be uncomplicated. If a field operator with communication to the Main Control Room is available to restore a piece of equipment that has been tagged Out of Service (OOS), can we credit the action of lifting the OOS as "uncomplicated", or is it to be regarded as more complex since it will involve more than a single action?

Response

The answer to the first question is yes. The second question is very situation specific, but most likely the answer would be no, because clearing tags for OOS equipment would be complicated and not meet the restoration criteria.

ID **Question**

74 <u>Hours Train Required</u>

NEI 99-02, Section 2.2, Mitigating Systems Cornerstone, Safety System Unavailability, Clarifying Notes, under Hours Train Required: For all other systems (e.g Aux Feed and HPSI), this value is estimated by the number of critical hours during the reporting period, because these systems are usually required to be in service only while the reactor is critical and for short periods during startup or shutdown. As I read this statement, we are to estimate by counting critical hours and are not required to count time in lower modes, even if that equipment is required to be operable per Tech Specs in the lower modes, correct?

Response

The default value in the denominator can be used to simplify data collection. However, the numerator must include all unavailable hours that the train is required, regardless of the default value.

ID **Question**

86 Off-normal events or accidents

In NEI 99-02, it states, “The purpose of the safety system unavailability indicator is to monitor the readiness of important safety systems to perform their safety functions in response to off-normal events or accidents.” **NEI 99-02 also** -states, “Hours required are the number of hours a monitored safety system is required to be available to satisfactorily perform its intended safety function.” Does the phrase "perform their safety functions in response to off-normal events or accidents” refer only to credited accidents in the UFSAR, or is it intended to include events such as an Appendix R event?

Response

Yes. ”Off-normal events or accidents” are as specified in your design and licensing bases, therefore, UFSAR and Appendix R events should be considered.

ID **Question**

87 Unavailability and Fault Exposure Hours

Should unavailability and fault exposure hours be counted for items that do not affect the automatic start and load of the Emergency Diesel Generators (EDG), but do affect the ability to manually start them?

Response

This is a plant specific question which must be answered based on safety function of the manual start feature. Make a best faith effort (which could include discussion with your resident) to determine the answer and document your decision.

ID **Question**

88 Certainty

If a failure occurs and the time of discovery is known and the time of failure can be estimated with an appropriate level of investigation, analysis and engineering judgment, should the fault exposure unavailability hours be determined **using this information or does** "Only the time of the failure’s discovery is known with certainty," imply that the time of failure must be known with certainty (and can not be determined through analysis, reviews, or engineering estimates)**?**

Response

The intent of the use of the term "with certainty" is to ensure an appropriate analysis and review is completed to determine the time of failure. The use of component failure analysis, circuit analysis, engineering judgement, or event investigations are acceptable provided these approaches are documented in your corrective action program and reviewed by management.

ID **Question**

145 **During refueling outages usually after reload, we conduct 4160 VAC electrical safeguards train bus outages with fuel in the core, but with the Refueling Cavity flooded (greater than 20 feet). As a result, 1 train of RHR cannot be used. Our plant shutdown safety assessment counts the refueling cavity flooded to > 20 feet and the upper internals removed as equivalent to one RHR train. Must we count the 2nd train of RHR as being unavailable when the refueling cavity is flooded?**

Response

If the PWR method described is an NRC approved alternate method (e.g., alternate method allowed by Technical Specifications) of removing core decay heat, then the RHR unavailability time for the first train would not be counted. If the second train is not required by Technical Specifications, then its unavailable hours would not count.

ID Question

146 In most plants, the RHR system performs the containment heat removal function (ECCS) and the shutdown cooling (SDC) function using common equipment. There are subsets of RHR equipment which are specific to only one of the functions such as the SDC suction valves from the RCS. Technical specifications generally do not require operability of the SDC function during power operation and activities affecting equipment specific only to SDC function are not tracked as LCOs. Should we monitor SDC specific equipment and report unavailability hours for the SDC function during periods when SDC is not required by technical specifications or monitor only what is required by Tech Specs that are mode specific?

Response

Reporting of unavailability hours for a multi-function system should be counted only during the time the particular affected function is required by technical specifications. For RHR, unavailability hours for containment heat removal are counted only when containment cooling is required by tech specs and SDC hours are counted only when the SDC function is required by tech specs. The two are added together to derive the total hours of RHR unavailability to be reported. Overlap times when both functions are required can be adjusted to eliminate double counting the same incident.

ID Question

147 NEI 99-02 states that Planned Unavailable Hours include testing, unless the configuration is automatically overridden by a valid starting signal or the function can be promptly restored, either by an operator in the control room or by a dedicated operator stationed locally for that purpose. If credit is taken for an operator in the control room, must it be a "dedicated" control room operator or can prompt operator actions be conducted by the same operator who would then perform the configuration restoration?

Response

Yes, a dedicated operator is required. The intent is that the configuration be restored promptly by an operator independent of other control room operator immediate actions that may also be required. Therefore, an individual must be "dedicated." Normal control room staffing may satisfy this purpose depending on work assignments during the configuration. However, in all cases the staffing consideration must be made in advance and purposely include the dedicated immediate response for the testing configuration.

1

ID Question

148 **NEI 99-02, section 2.2, under "Systems Required to be in Service at All Times", states with fuel still in the reactor vessel, when decay heat is so low that forced flow for cooling purposes, even on an intermittent basis, is no longer required (ambient losses are enough to offset the decay heat load), component planned or unplanned unavailable hours are not reportable.**

According to our Tech Specs Bases 3.9.7, "...At reactor coolant temperatures < 150°F, natural circulation alone is adequate to provide the required decay heat removal capability while maintaining adequate margin to the reactor coolant temperature (212°F) at which a mode change would occur."

However, without stating a given starting temperature the parenthetical clarification may be thermodynamically meaningless. The Tech Spec bases provide that starting temperature, i.e., "less than 150°F". Beginning from any initial temperature < 150°F, reactor coolant temperature may initially increase but only to some equilibrium (which will be less than 212°F). After equilibrium, ambient losses will offset decay heat load.

Therefore, planning a common SDC suction window outage (complete loss of RHR) when ambient heat loss's were enough to offset decay heat (reactor loaded, fuel pool gates open, fuel pool cooling in service to keep temps below 150F) has been a past practice.

Is this what is meant by the parenthetical condition "ambient losses are enough to offset the decay heat load?"

Response

No. If the spent fuel pool cooling system is required to maintain reactor coolant temperatures less than 150 degrees F then ambient losses are not sufficient to offset the decay heat load. Therefore, unavailable hours for the RHR system would be counted.

2

ID Question

149 **NEI document 99-02 requires monitoring PWR RHR Systems for the following functions:**

- **the ability of the RHR system to take a suction from the containment sump, cool the fluid, and inject at low pressure into the RCS, and**
- **the ability of the RHR system to remove decay heat from the reactor during a normal shutdown for refueling or maintenance.**

On Millstone Unit 3, there is a separate system that performs each of the functions. The shutdown cooling/decay heat removal function is monitored by RHS and post accident recirculation function is monitored by RSS. For Millstone Unit 3 removing RHS (which is required for function 2), during Mode 1 does not affect the ability to meet the post accident recirculation function and therefore does not result in any unavailability for post accident recirculation (function 1). NEI 99-02 states that the required hours for residual heat removal is estimated by number of hours in the reporting period since the residual heat removal system is required to be available at all times. Please clarify the mode requirements for the two separate functions and specifically address the following question: Is the system which provides the shutdown cooling function (function 2) required to be monitored for unavailability in all modes even if removing it has no impact on the post-accident recirculation function?

Response

Reporting of unavailability hours for multi-system should be counted only during the time the particular affected function is required by technical specifications.

The two systems are added together to derive the total hours of RHR unavailability to be reported. Overlap times when both functions/systems are required can be adjusted to eliminate double counting the same incident.

ID 150

Question

Prior to performing surveillance testing, a Diesel Generator may be placed in an unavailable condition to allow for moisture checks. This may require opening all cylinder petcocks (test valves) and engaging the engine barring device. WANO guidance allows for not reporting unavailable hours provided the testing configuration can be quickly overridden within a few minutes by the control room or having operators stationed locally for that specific purpose. Does this condition require reporting unavailable hours to the NRC?

Response

Yes. The situation described is more complex than the few simple operator actions that current guidance allows to be excluded.

ID 151

Question

Section 2.2, Mitigating Systems Cornerstone, Safety System Unavailability, Clarifying Notes, Hours Train Required states the Emergency AC power system value is estimated by the number of hours in the reporting period because emergency generators are normally expected to be available for service during both plant operations and shutdown. Considering only one train of Emergency AC power systems may be required in certain operational modes (e.g. when defueled), should actual required hours be determine for each train in place of using the default period hours? In certain operational modes it appears inconsistent to use period hours for hours required, yet not report the unavailable hours if a train is removed from service and Technical Specifications are still satisfied.

Response

For the situation described it is acceptable to report the default value that is period hours.

ID 152

Question

Support systems (service water, component cooling, electrical) at our plant for HPSI and RHR each contain 100% redundant equipment. On a periodic basis, these systems and equipment are realigned to swap components, flow paths or alignments as part of normal operation. The evolutions are frequently performed, by procedure with the operator in close contact with the control room and dedicated to the evolutions. The evolutions can be stopped, backed out and the systems restored to the original configuration at any point of the procedure. The ability of safety systems HPSI and RHR to actuate and start is not impaired by these evolutions. Restoration actions are virtually certain to be successful. Does the time to perform these evolutions on a support system need to be counted as unavailability for HPSI and RHR?

Response

No. As described in the question, the ability of safety systems HPSI and RHR to actuate and start is not impaired by these evolutions. There are no unavailable hours.

ID Question

153 The 99-02 mitigating system guidance and FAQ's indicate that unless we can "promptly" recover the system, we must count it as unavailable. Is this correct as applied to the RHR Unavailability PI?

Our position for the RHR suppression pool cooling/shutdown cooling PI for INPO reporting has been that up to a 5 hour recoverability time is appropriate in contrast to the 99-02 criteria of "promptly". We understand it's appropriateness for HPCI, RCIC and the diesels since they are expected to automatically and "immediately" respond to a plant event. Use of this 99-02 criteria will have implications for our work management practices. Use of this criterion makes no sense for a system that does not have to respond automatically to an event.

Response

Yes. However, the unavailable hours are not counted provided an NRC approved alternative method of removing decay heat is available.

ID Question

154 When accounting for Fault Exposure Hours during a current quarter it is discovered that the Fault Exposure Hours (T/2) would also have been accrued in the previous quarter (overlapped with previous quarter). Does the previously submitted quarterly data need to be revised to reflect the Fault Exposure Hours that were assumed to occur in the previous quarter?

Response

The fault exposure unavailable hours associated with a component failure may include unavailable hours covering several reporting periods (e.g., several quarters). In this case, the fault exposure unavailable hours should be assigned to the appropriate reporting periods. For example, if a failure is discovered on the 10th day of a quarter and the estimated number of unavailable hours is 300 hours, then 240 hours should be counted for the current quarter and 60 unavailable hours should be counted for the previous quarter. Note: This will require an update of the previous quarter's data.

ID Question

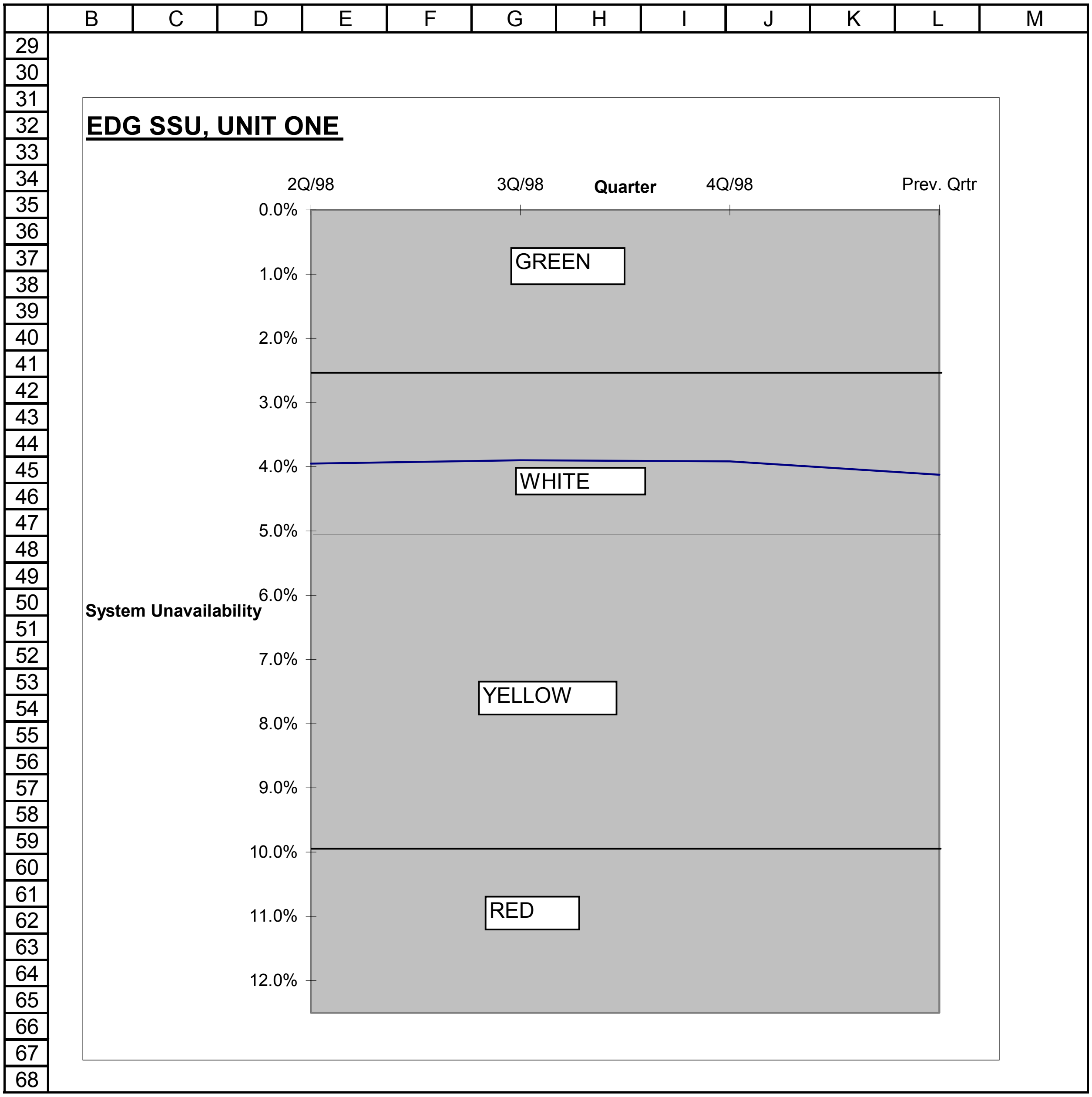
155 If a plant has two, 100% capacity, NRC approved, alternate shutdown cooling trains in operation during a refueling outage, may the plant take credit for these two trains and take both trains of the residual heat removal system out of service at the same time without incurring unavailability?

Response

Yes, provided that both alternate means of heat removal are capable of performing the heat removal function when placed in service simultaneously.

Data Example

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	**Safety System Unavailability ((SSU), AC Emergency Power, 'UNIT ONE**																	
2																		
3	***Train 1 A***	**2Q/95**	**3Q/95**	**4Q/95**	**1Q/96**	**2Q/96**	**3Q/96**	**4Q/96**	**1Q/97**	**2Q/97**	**3Q/97**	**4Q/97**	**1Q/98**	**2Q/98**	**3Q/98**	**4Q/98**	**Prev. Qrtr**	
4	Planned Unavailable Hours	5	0	5	0	128	0	0	0	0	0	128	0	0	0	0	10	
5	Unplanned Unavailable Hours	0	0	0	48	0	5	0	0	36	0	12	0	0	24	0	48	
6	Fault Exposure Unavailable	0	0	5	32	0	504	0	0	336	0	36	0	0	24	0	128	
7	Hours Unavailable (quarter)	5	0	10	80	128	509	0	0	372	0	176	0	0	48	0	186	
8	Total Hours Unavailable												1280	1275	1323	1313	1419	
9	Hours Train Required for Service	2160	2184	2208	2208	2160	2184	2208	2208	2160	2184	1104	2208	2160	2184	2208	2208	
10	Total Hrs Train Req'd for Service												25176	25176	25176	25176	25176	
11	Train Unavailability												0.050842	0.050643	0.05255	0.052153	0.056363	
12																		
13																		
14	***Train S (Swing EDG)***	**2Q/95**	**3Q/95**	**4Q/95**	**1Q/96**	**2Q/96**	**3Q/96**	**4Q/96**	**1Q/97**	**2Q/97**	**3Q/97**	**4Q/97**	**1Q/98**	**2Q/98**	**3Q/98**	**4Q/98**	**Prev. Qrtr**	
15	Planned Unavailable Hours	0	16	6	0	0	0	4	0	0	0	128	0	4	0	4	0	
16	Unplanned Unavailable Hours	11	0	0	0	56	11	0	1	0	0	12	0	0	1	0	0	
17	Fault Exposure Unavailable	0	60	0	0	0	70	148	0	65	0	131	3	0	0	19	0	
18	Hours Unavailable (quarter)	11	76	6	0	56	81	152	1	65	0	271	3	4	1	23	0	
19	Total Hours Unavailable												722	715	640	657	657	
20	Hours Train Required for Service	2160	2184	2208	2208	2160	2184	2208	2208	2160	2184	1104	2208	2160	2184	2208	2208	
21	Total Hrs Train Req'd for Service												25176	25176	25176	25176	25176	
22	Train Unavailability												0.028678	0.0284	0.025421	0.026096	0.026096	
23																		
24																		
25	**For EDG system, two unit, one dedicated, one swing EDG**																	
26	**Quarter**												**1Q/98**	**2Q/98**	**3Q/98**	**4Q/98**	**Prev. Qrtr**	
27	**System unavailability**												4.0%	4.0%	3.9%	3.9%	4.1%	
28																		
29																		


EDG SSU, UNIT ONE
Quarter
2Q/98
3Q/98
4Q/98
Prev. Qrtr
System Unavailability
0.0%
1.0%
2.0%
3.0%
4.0%
5.0%
6.0%
7.0%
8.0%
9.0%
10.0%
11.0%
12.0%
GREEN
WHITE
YELLOW
RED

ADDITIONAL GUIDANCE FOR SPECIFIC SYSTEMS

Emergency AC Power Systems

Definition and Scope

This section provides additional guidance for reporting performance of the emergency AC power system. The emergency AC power system is typically comprised of two or more independent emergency generators that provide AC power to class 1E buses following a loss of off-site power. The emergency generator dedicated to providing AC power to the high pressure core spray system in BWRs is also within the scope of emergency AC power.

The function monitored for the indicator is:

- The ability of the emergency generators to provide AC power to the class lE buses upon a loss of off-site power.

Most emergency generator trains include dedicated subsystems such as air start, lube oil, fuel oil, cooling water, etc. Support systems can include service water, DC power, and room cooling. Generally, unavailable hours are counted if a failure or unavailability of a dedicated subsystem or a support subsystem prevents the emergency generator from performing its function. Some examples are discussed in the clarifying notes for this attachment.

The electrical circuit breaker(s) that connect(s) an emergency generator to the class lE buses that are normally served by that emergency generator are considered to be part of the emergency generator train.

Emergency generators that are not safety grade, or that serve a backup role only (e.g., an alternate AC power source), are not required to be included in the performance reporting.

Train Determination

The system unavailability is calculated on a per unit basis using the train unavailability value for each emergency diesel generator (EDG) that provides emergency AC power to that unit. The number of emergency AC power system trains for a unit is equal to the number of class 1E emergency generators that are available to power safe-shutdown loads in the event of a loss of off-site power for that unit. There are three typical configurations for EDGs at a multi-unit station:

1. EDGs dedicated to only one unit.
2. One or more EDGs are available to “swing” to either unit
3. All EDGs can supply all units

For configuration 1, the number of trains for a unit is equal to the number of EDGs dedicated to the unit. For configuration 2, the number of trains for a unit is equal to the number of dedicated EDGs for that unit plus the number of “swing” EDGs available to that unit (i.e., The “swing” EDGs are included in the train count for each unit). For configuration 3, the number of trains is equal to the number of EDGs.

Clarifying Notes

Emergency diesel generators that are dedicated to the High Pressure Core Spray (HPCS) in some BWRs should be included as a train in the Emergency AC Power calculation.

When a unit(s) is shutdown, one emergency AC power train at a time may be removed from service without incurring planned or unplanned unavailable hours under the following conditions:

For a single or multi-unit station with all units shut down, one emergency generator (EDG) at a time may be electively removed from service without reporting planned and unplanned unavailable hours providing that at least one **functional** EDG is available to supply emergency loads.

For a multi-unit station with one unit shut down and all other units operating, one EDG at a time may be electively removed from service without reporting planned and unplanned unavailable hours providing that both of the following criteria are satisfied:

- the EDG removed from service is associated primarily with a unit that is shut down.

- removal of the EDG from service has little effect on the safety of the operating units (i.e., required emergency loads for each operating unit can be met, even when accounting for the single failure of an operable EDG), and there is still an operable emergency generator available to the shutdown unit.

Fault exposure unavailable hours are not counted for failures of an EDG to start or load-run if the failure can be definitely attributed to reasons listed in the General Clarifying Notes for Safety System Unavailability, or to any of the following:

- spurious operation of a trip that would be bypassed in the loss of offsite power emergency operating mode (e.g., high cooling water temperature trip that erroneously tripped an EDG although cooling water temperature was normal).

- malfunction of equipment that is not required to operate during the loss of offsite power emergency operating mode (e.g., circuitry used to synchronize the EDG with off-site power sources, but not required when off-site power is lost)

- a failure to start because a redundant portion of the starting system was intentionally disabled for test purposes, if followed by a successful start with the starting system in its normal alignment

When determining fault exposure unavailable hours for a failure of an EDG to load-run following a successful start, the last successful operation or test is the previous successful load-run (not just a successful start). To be considered a successful load-run operation or test, an EDG load-run attempt must have followed a successful start and satisfied one of the following criteria:

- a load-run of any duration that resulted from a real (e.g., not a test) manual or automatic start signal

- a load-run test that successfully satisfied the plant's load and duration test specifications

- other operation (e.g., special tests) in which the emergency generator was run for at least one hour with at least 50 percent of design load.

When an EDG fails to satisfy the 12/18/24-month 24-hour duration surveillance test, the faulted hours are computed based on the last known satisfactory load test of the diesel generator as defined in the three bullets above. For example, if the EDG is shut down during a surveillance test because of a failure that would prevent the EDG from satisfying the surveillance criteria, the fault exposure unavailable hours would be computed based upon the time of the last surveillance test that would have exposed the discovered fault.

BWR High Pressure Injection Systems

(High Pressure Coolant Injection, High Pressure Core Spray, and Feedwater Coolant Injection)

Definition and Scope

This section provides additional guidance for reporting the performance of three BWR systems used primarily for maintaining reactor coolant inventory at high pressures: the high pressure coolant injection (HPCI), high pressure core spray (HPCS), and feedwater coolant injection (FWCI) systems. Plants should monitor either the HPCI, HPCS, or FWCI system, depending on which is installed. These systems function at high pressure to maintain reactor coolant inventory and to remove decay heat following a small-break Loss of Coolant Accident (LOCA) event or a loss of main feedwater event.

The function monitored for the indicator is:

- The ability of the monitored system to take suction from the condensate storage tank or from the suppression pool and inject at rated pressure and flow into the reactor vessel.

This capability is monitored for the injection and recirculation phases of the high pressure system response to an accident condition.

Figures 2.1, 2.2, and 2.3 show generic schematics for the HPCI, HPCS, and FWCI systems, respectively. These schematics indicate the components for which train unavailable hours normally are monitored. Plant-specific design differences may require other components to be included.

Train Determination

The HPCI system is considered a single-train system. The booster pump and other small pumps shown in Figure 2.1 are ancillary components not used in determining the number of trains. The effect of these pumps on HPCI performance is included in the system unavailability indicator to the extent their failure detracts from the ability of the system to perform its monitored function. The HPCI turbine, governor, and associated valves and piping for steam supply and exhaust are in the scope of the HPCI system. Valves in the feedwater line are not considered within the scope of the HPCI system.

The HPCS system is also considered a single-train system. Unavailability is monitored for the components shown in Figure 2.2. The HPCS diesel generator is considered to be part of the emergency AC power system.

For the feedwater injection system, the number of trains is determined by the number of main feedwater pumps that can be used at one time in this operating mode (typically one). Figure 2.3 illustrates a typical FWCI system.

Clarifying Notes

The HPCS system typically includes a "water leg" pump to prevent water hammer in the HPCS piping to the reactor vessel. The "water leg" pump and valves in the "water leg" pump flow path are ancillary components and are not directly included in the scope of the HPCS system for the performance indicator.

For the feedwater coolant injection system, condensate and feedwater booster pumps are not used to determine the number of trains.

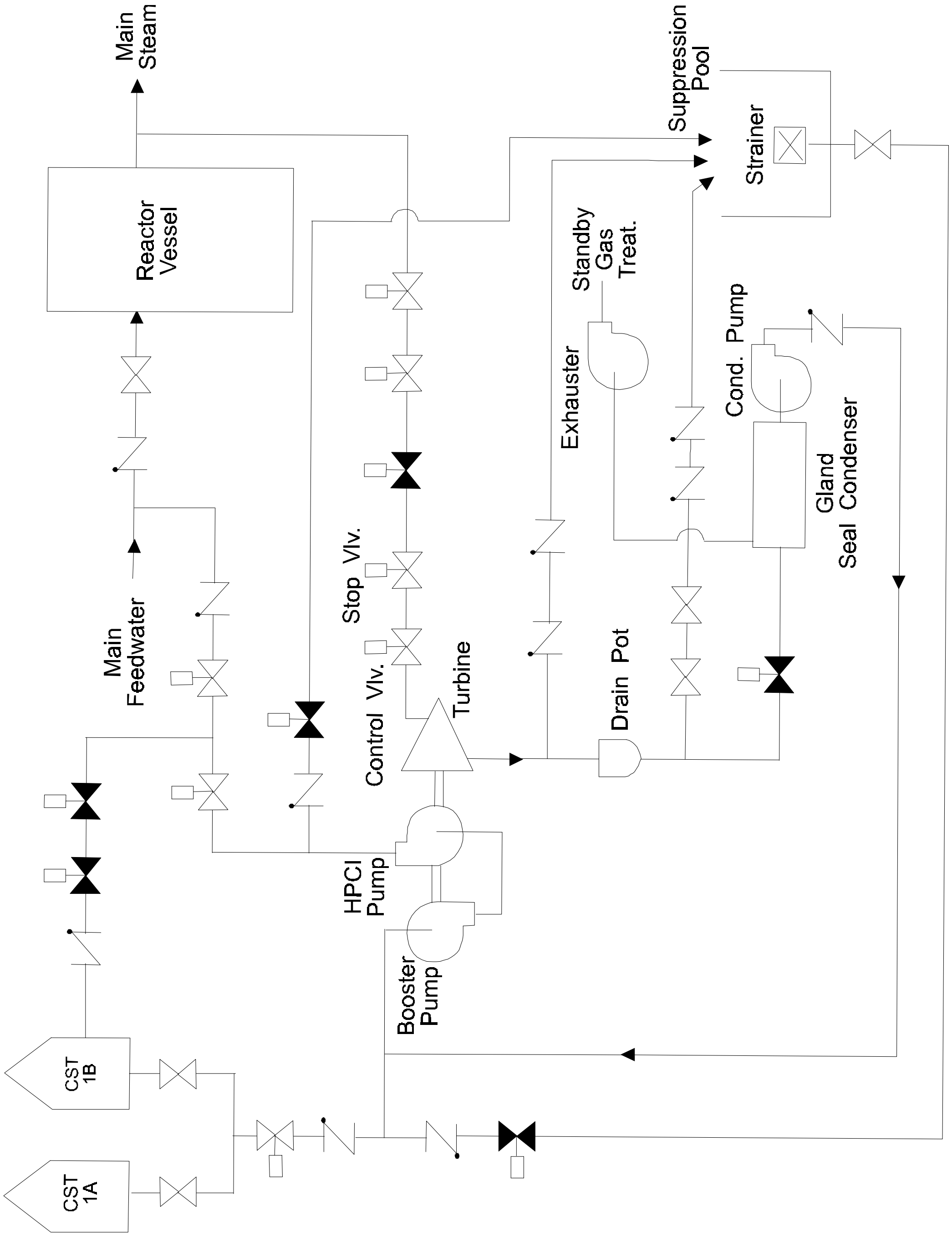


Figure 2.1
High Pressure Coolant Injection System
(Example of Reporting Scope)

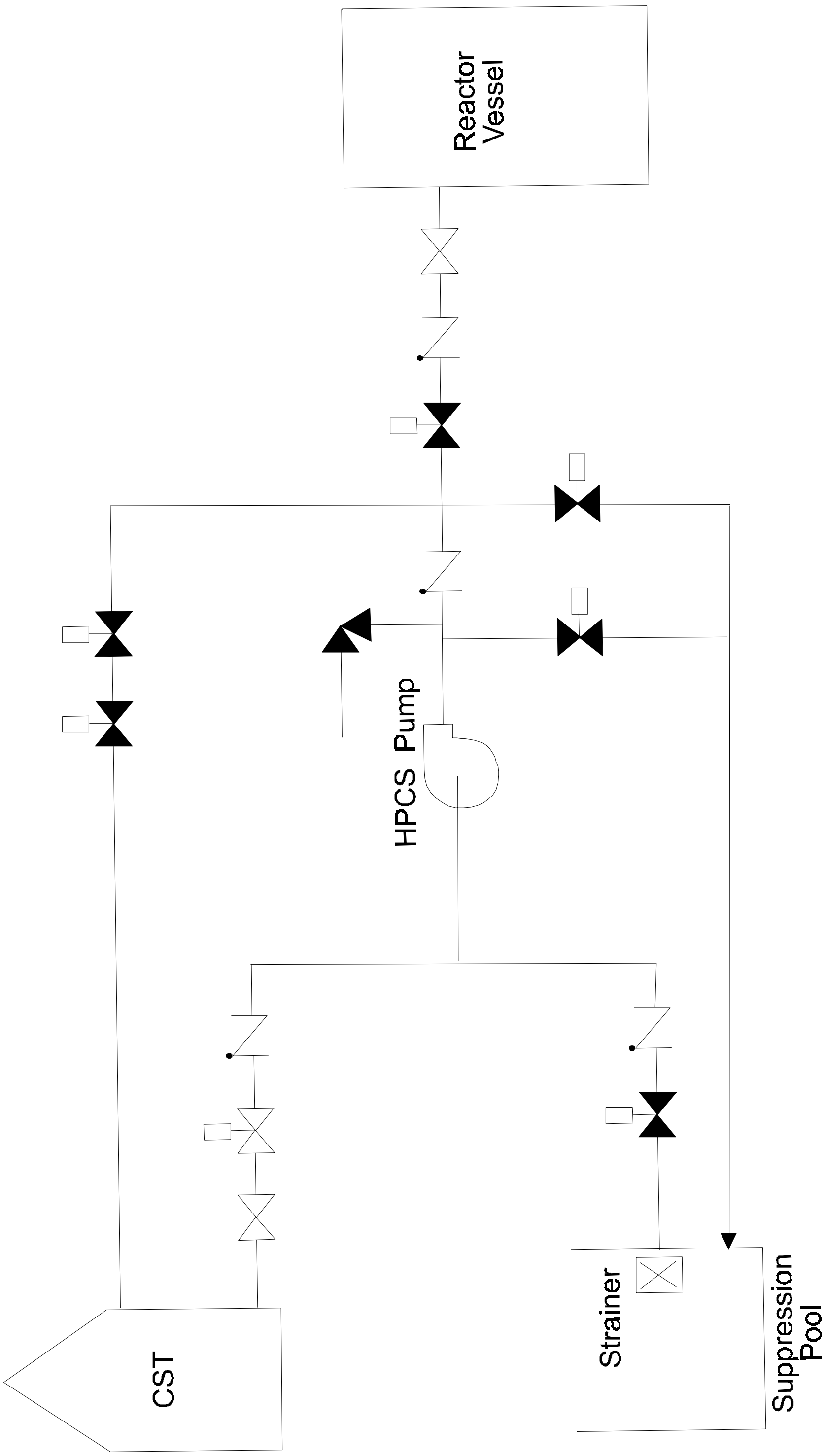


Figure 2.2
High Pressure Core Spray System
(Example of Reporting Scope)

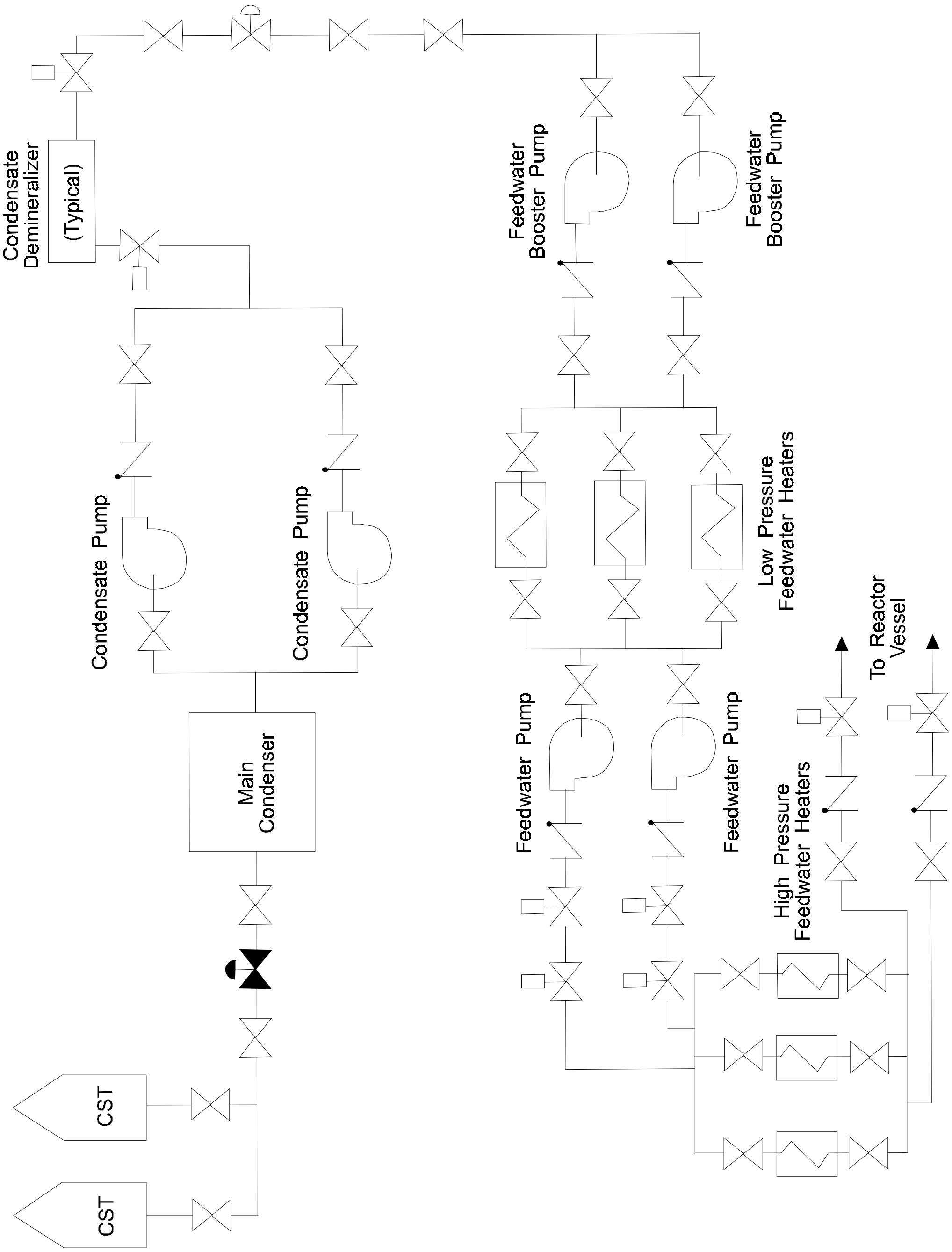


Figure 2.3
Feedwater Coolant Injection System
(Example of Reporting Scope)

BWR Heat Removal Systems

(Reactor Core Isolation Cooling)

Definition and Scope

This section provides additional guidance for reporting the performance of **a** BWR system that **is** used primarily for decay heat removal at high pressure: reactor core isolation cooling (RCIC) system. Th**is** system function**s** at high pressure to remove decay heat following a loss of main feedwater event. The RCIC system also function**s** to maintain reactor coolant inventory following a very small LOCA event.

The function monitored for the indicator, is:

- the ability of the RCIC system to cool the reactor vessel core and provide makeup water by taking a suction from either the condensate storage tank or the suppression pool and injecting at rated pressure and flow into the reactor vessel

Figures 3.1 show**s a** generic schematic for the RCIC system. Th**is** schematic indicate**s** the components for which train unavailability is monitored. Plant-specific design differences may require other components to be included.

Train Determination

The RCIC system is considered a single-train system. The condensate and vacuum pumps shown in Figure 3.1 are ancillary components not used in determining the number of trains. The effect of these pumps on RCIC performance is included in the system unavailability indicator to the extent that a component failure results in an inability of the system to perform its monitored function. The RCIC turbine, governor, and associated valves and piping for steam supply and exhaust are in the scope of the RCIC system. Valves in the feedwater line are not considered within the scope of the RCIC system.

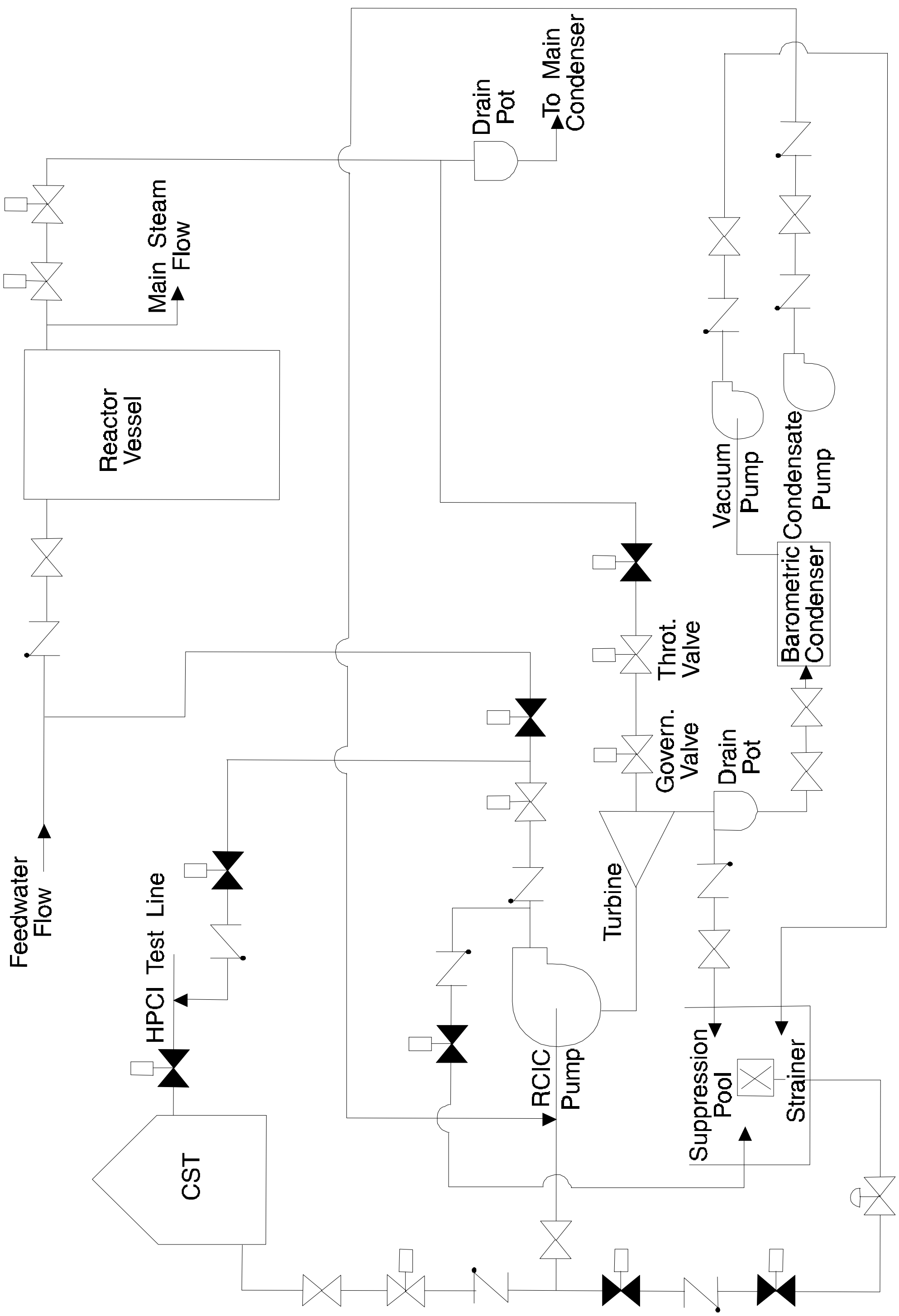


Figure 3.1
Reactor Core Isolation Cooling System
(Example of Reporting Scope)

BWR Residual Heat Removal Systems

Definition and Scope

This section provides additional guidance for reporting the performance of the BWR residual heat removal (RHR) system for the suppression pool cooling and shutdown cooling modes. The attachment also includes guidance for reporting performance of other systems used to remove heat to outside containment under low pressure conditions at early BWRs where two separate systems provide these functions with unique designs. The suppression pool cooling function is used whenever the suppression pool (or torus) water temperature exceeds or is expected to exceed a high-temperature setpoint (for example, following most relief valve openings or during some post-accident recoveries). The shutdown cooling function is used following any transient requiring normal long-term heat removal from the reactor vessel.

The functions monitored for the indicator are:

- the ability of the RHR system to remove heat from the suppression pool so that pool temperatures do not exceed plant design limits, and

- the ability of the RHR system to remove decay heat from the reactor core during a normal unit shutdown (e.g., for refueling or for servicing).

Figures 4.1 and 4.2 show generic schematics with the RHR system in the suppression pool cooling and shutdown cooling modes, respectively. Two variations of basic RHR system design are shown in Figures 4.3 and 4.4. These are included to illustrate reporting for systems with redundant and series components, respectively. The figures indicate the components for which train unavailability is monitored. Plant-specific design differences may require other components to be included.

Train Determination

The number of trains in the RHR system is determined by the number of parallel RHR heat exchangers capable of performing suppression pool cooling or shutdown cooling. The following discussion demonstrates train determination for various generic system designs.

Figures 4.1 and 4.2 illustrate a common RHR system that incorporates four pumps and two heat exchangers arranged so that each heat exchanger can be supplied by one of two pumps. This is a two-train RHR system.

Some trains have two heat exchangers in series, as shown in Figure 4.3. The system depicted in Figure 4.3 is also a two-train RHR system.

Figure 4.4 shows an arrangement with four parallel sets of a pump and a heat exchanger combination. This system is a four-train RHR system.

Other Systems: For some early BWRs, separate systems are used to remove heat to outside the containment under low pressure conditions. Depending on the particular design, one or more of the following systems may be used: shutdown cooling, containment spray, or RHR (torus cooling function). For example, a unit using a shutdown cooling system (with three heat exchangers)and a containment spray system (with two heat exchangers) would monitor each system separately for the safety system unavailability indicators. All components required for each safety system to perform its heat removal function should be included in the scope. The number of trains is determined by the number of heat exchangers in the systems that perform the heat removal function under low pressure conditions (five trains in this example).

Clarifying Notes

The low pressure coolant injection (LPCI), steam cooling, and containment spray modes of RHR operation are not monitored.

Some components are used to provide more than one function of RHR. If a component cannot perform as designed, rendering its associated train incapable of meeting one or both of the monitored functions, then the train is considered to be failed. Unavailable hours (if the train was required to be available for service) would be reported as a result of the component failure.

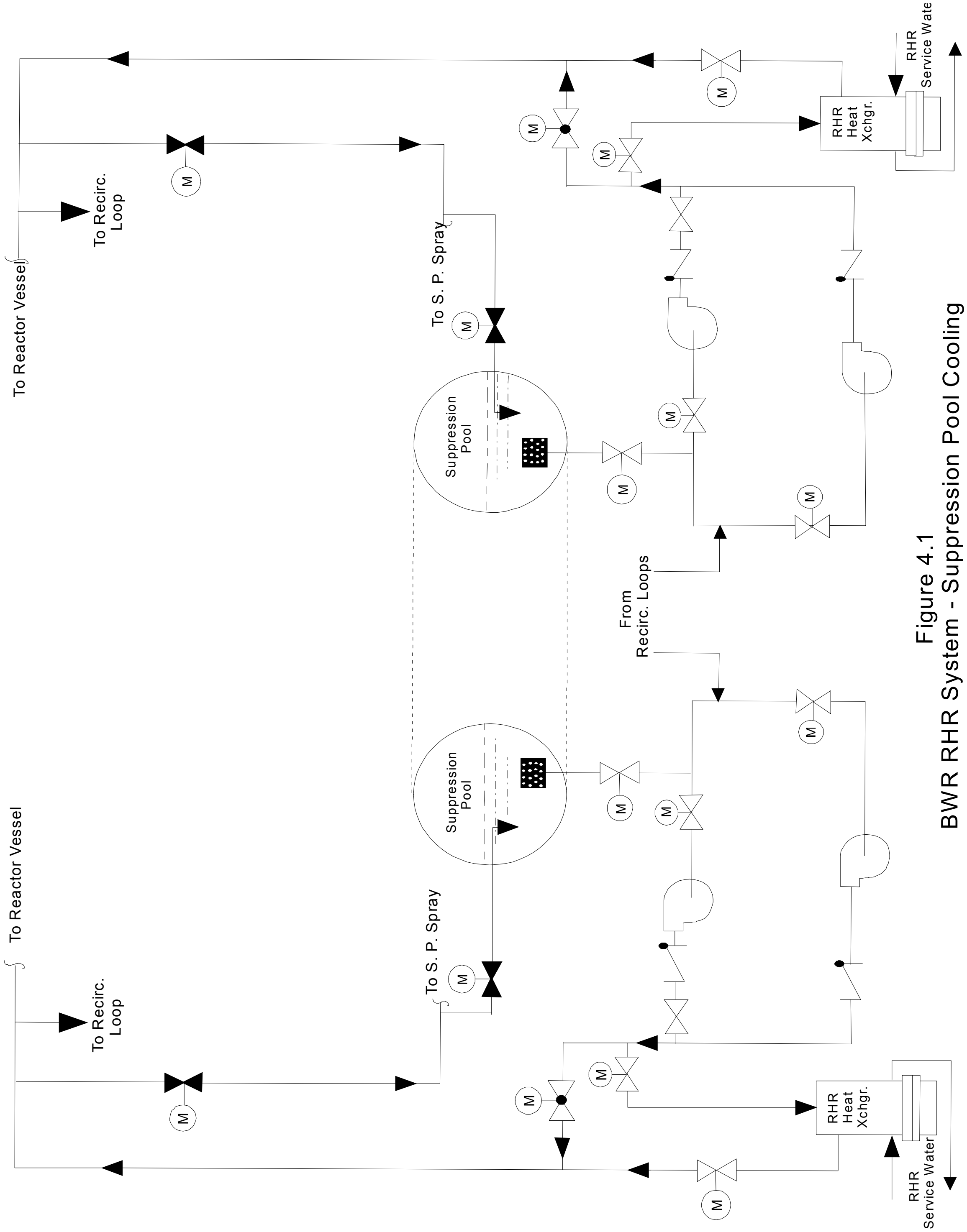


Figure 4.1
BWR RHR System - Suppression Pool Cooling

1

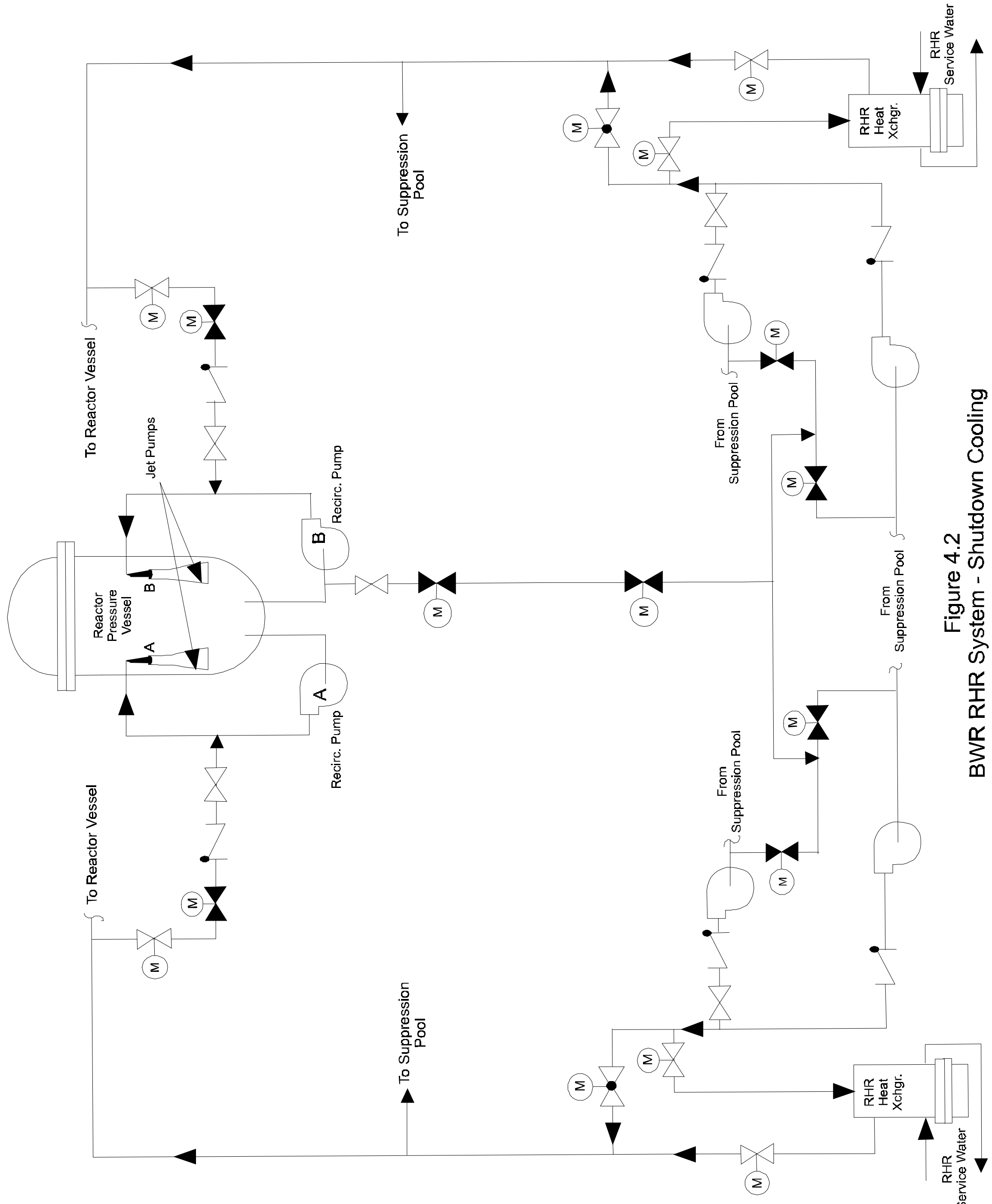


Figure 4.2
BWR RHR System - Shutdown Cooling

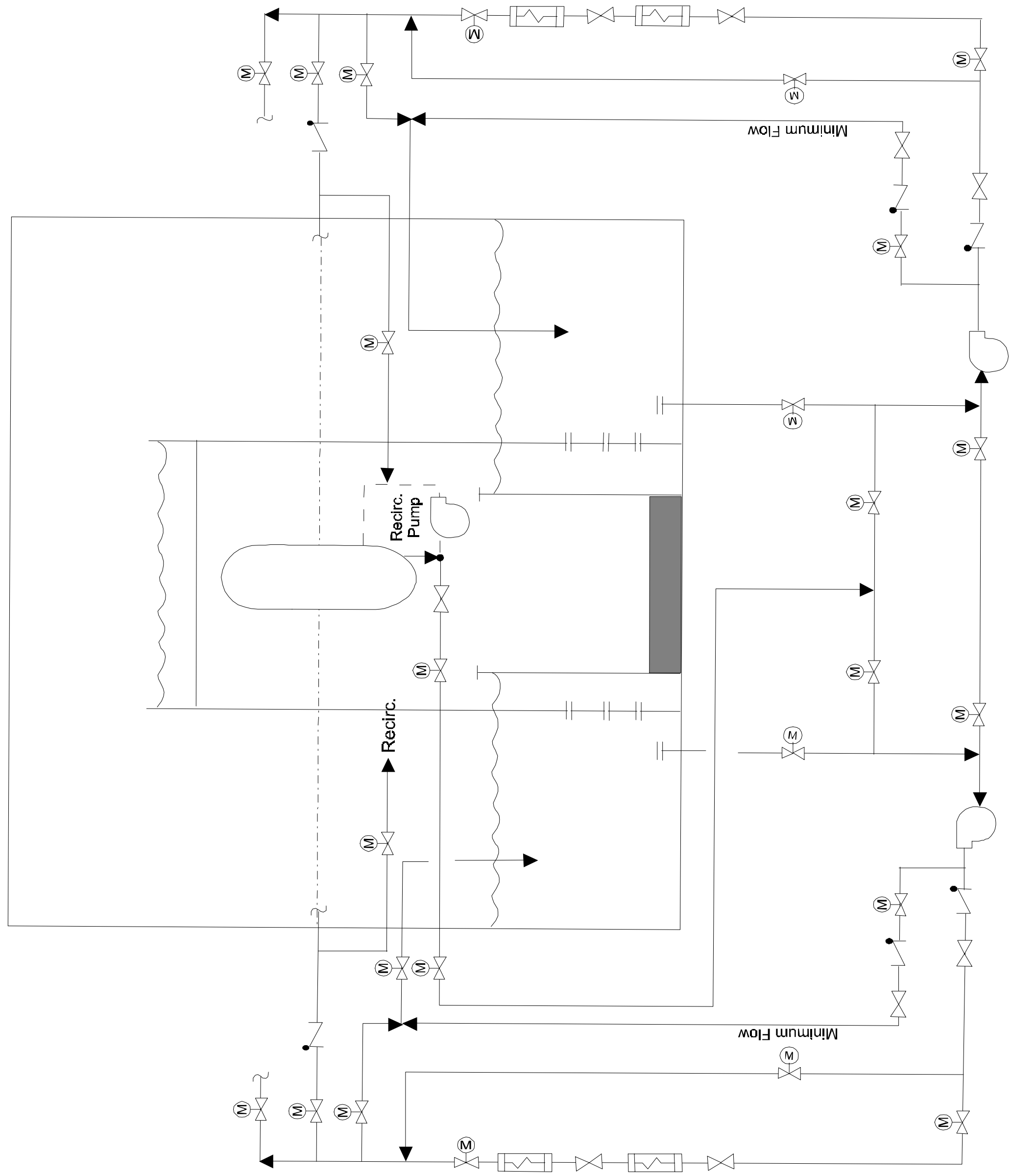


Figure 4.3
Two-Train BWR RHR System
(Example of Reporting Scope)

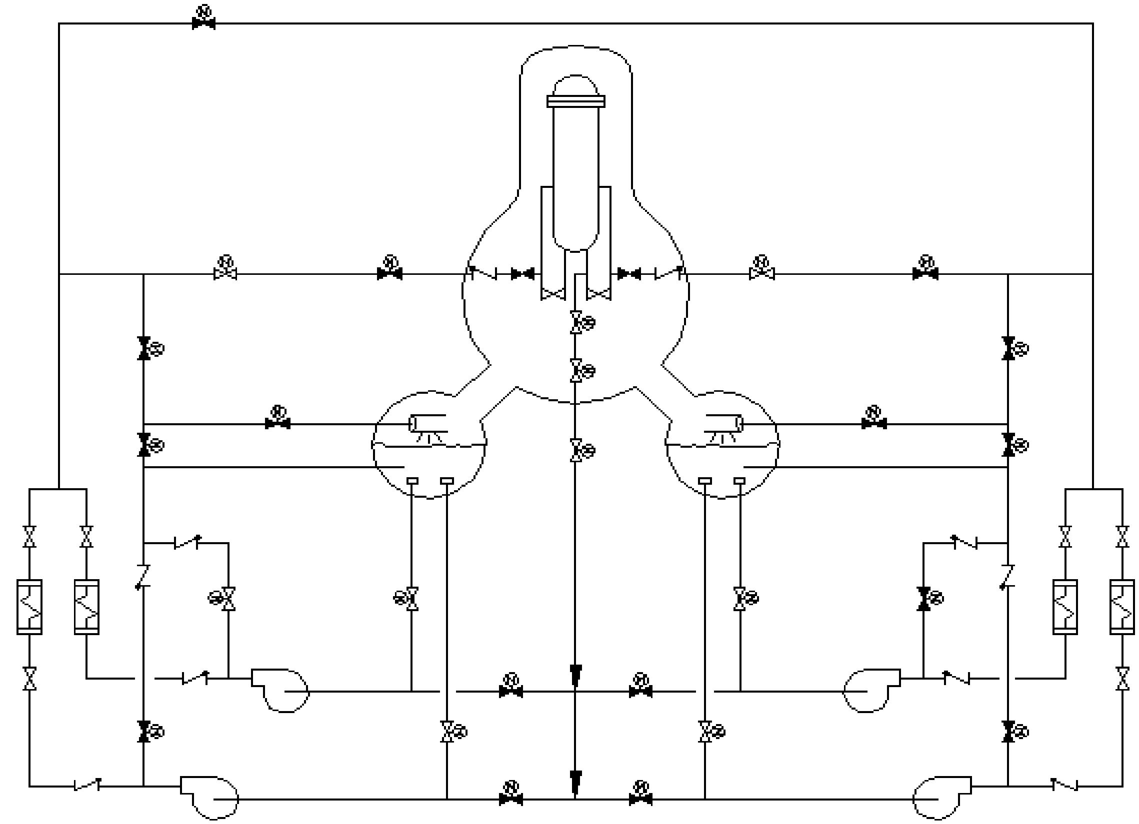


Figure 4.4 - 4 Train BWR RHR System

PWR High Pressure Safety Injection Systems

Definition and Scope

This section provides additional guidance for reporting the performance of PWR high pressure safety injection (HPSI) systems. These systems are used primarily to maintain reactor coolant inventory at high pressures following a loss of reactor coolant. HPSI system operation following a small-break LOCA involves transferring an initial supply of water from the refueling water storage tank (RWST) to cold leg piping of the reactor coolant system. Once the RWST inventory is depleted, recirculation of water from the reactor building emergency sump is required. Components in the flow paths from each of these water sources to the reactor coolant system piping are included in the scope for the HPSI system. (Because the residual heat removal system has been added to the PWR scope, the isolation valve(s) between the RHR system and the HPSI pump suction is the boundary of the HPSI system. The RHR pumps used for piggyback operation are no longer in HPSI scope.)

There are design differences among HPSI systems that affect the scope of the components to be included for the HPSI system function. For the purpose of the safety system unavailability indicator, and where applicable, the HPSI system includes high head pumps (centrifugal charging pumps/high head safety injection pumps) which discharge at pressures of 2,200-2,500 psig and intermediate head pumps (intermediate head safety injection pumps) which discharge at pressures of 1200-1700 psig, along with associated components in the suction and discharge piping to the reactor coolant system cold-legs or hot-legs.

The function monitored for HPSI is:

- the ability of a HPSI train to take a suction from the primary water source (typically, a borated water tank), or from the containment emergency sump, and inject into the reactor coolant system at rated flow and pressure.

The charging and seal injection functions provided by centrifugal charging pumps in some system designs are not included within the scope of the safety system unavailability indicator reports.

Figures 5.1 through 5.4 show some typical HPSI system configurations for which train functions are monitored. The figures contain variations that are somewhat reactor vendor specific. They also indicate the components for which train unavailability is monitored. Plant-specific design differences may require other components to be included.

Train Determination

In general, the number of HPSI system trains is defined by the number of high head injection paths that provide cold-leg and/or hot-leg injection capability, as applicable. This is necessary to fully account for system redundancy.

Figure 5.1 illustrates a typical HPSI system for Babcock and Wilcox (B&W) reactors. The design features centrifugal pumps used for high pressure injection (about 2,500 psig) and no hot-leg injection path. Recirculation from the containment sump requires operation of pumps in the residual heat removal system. The system in Figure 5.1 is a two-train system, with an installed spare pump (depending on plant-specific design) that can be aligned to either train.

HPSI systems in some older, two-loop Westinghouse plants may be similar to the system represented in Figure 5.1, except that the pumps operate at a lower pressure (about 1600 psig) and there may be a hot-leg injection path in addition to a cold-leg injection path (both are included as a part of the train).

Figure 5.2 is typical of HPSI designs in Combustion Engineering (CE) plants. The design features three centrifugal pumps that operate at intermediate pressure (about 1300 psig) and provide flow to two cold-leg injection paths or two hot-leg injection paths. In most designs, the HPSI pumps take suction directly from the containment sump for recirculation. In these cases, the sump suction valves are included within the scope of the HPSI system. This is a two-train system (two trains of combined cold-leg and hot-leg injection capability). One of the three pumps is typically an installed spare that can be aligned to either train or only to one of the trains (depending on plant-specific design).

A HPSI system typical of those installed in Westinghouse three-loop plants is shown in Figure 5.3. This design features three centrifugal pumps that operate at high pressure (about 2500 psig), a cold-leg injection path through the BIT (with two trains of redundant valves), an alternate cold-leg injection path, and two hot-leg injection paths. One of the pumps is considered an installed spare. Recirculation is provided by taking suction from the RHR pump discharges. A train consists of a pump, the pump suction valves and boron injection tank (BIT) injection line valves electrically associated with the pump, and the associated hot-leg injection path. The alternate cold-leg injection path is required for recirculation, and should be included in the train with which its isolation valve is electrically associated. Thus, Figure 5.3 represents a two-train HPSI system.

Four-loop Westinghouse plants may be represented by Figure 5.4. This design features two centrifugal pumps that operate at high pressure (about 2500 psig), two centrifugal pumps that operate at an intermediate pressure (about 1600 psig), a BIT injection path (with two trains of injection valves), a cold-leg safety injection path, and two hot-leg injection paths. Recirculation is provided by taking suction from the RHR pump discharges. Each of two high pressure trains is comprised of a high pressure centrifugal pump, the pump suction valves and BIT valves that are electrically associated with the pump. Each of two intermediate pressure trains is comprised of the safety injection pump, the suction valves and the hot-leg injection valves electrically associated with the pump. The cold-leg safety injection path can be fed with either safety injection pump, thus it should be associated with both intermediate pressure trains. The HPSI system represented in Figure 5.4 is considered a four-train system for monitoring purposes.

Clarifying Notes

Many plants have charging pumps (typically, positive displacement charging pumps) that are not safety-related, provide a small volume of flow, and do not automatically start on a safety injection signal. These pumps should not be included within the scope of HPSI system for this indicator.

Some HPSI components may be included in the scope of more than one train. For example, cold-leg injection lines may be fed from a common header that is supplied by both HPSI trains. In these cases, the effects of testing or component failures in an injection line should be reported in both trains.

At many plants, recirculation of water from the reactor building sump requires that the high pressure injection pump take suction via the low pressure injection/residual heat removal pumps. For these plants, the low pressure injection/residual heat removal pumps discharge header isolation valve to the HPSI pump suction is included in the scope of HPSI system.

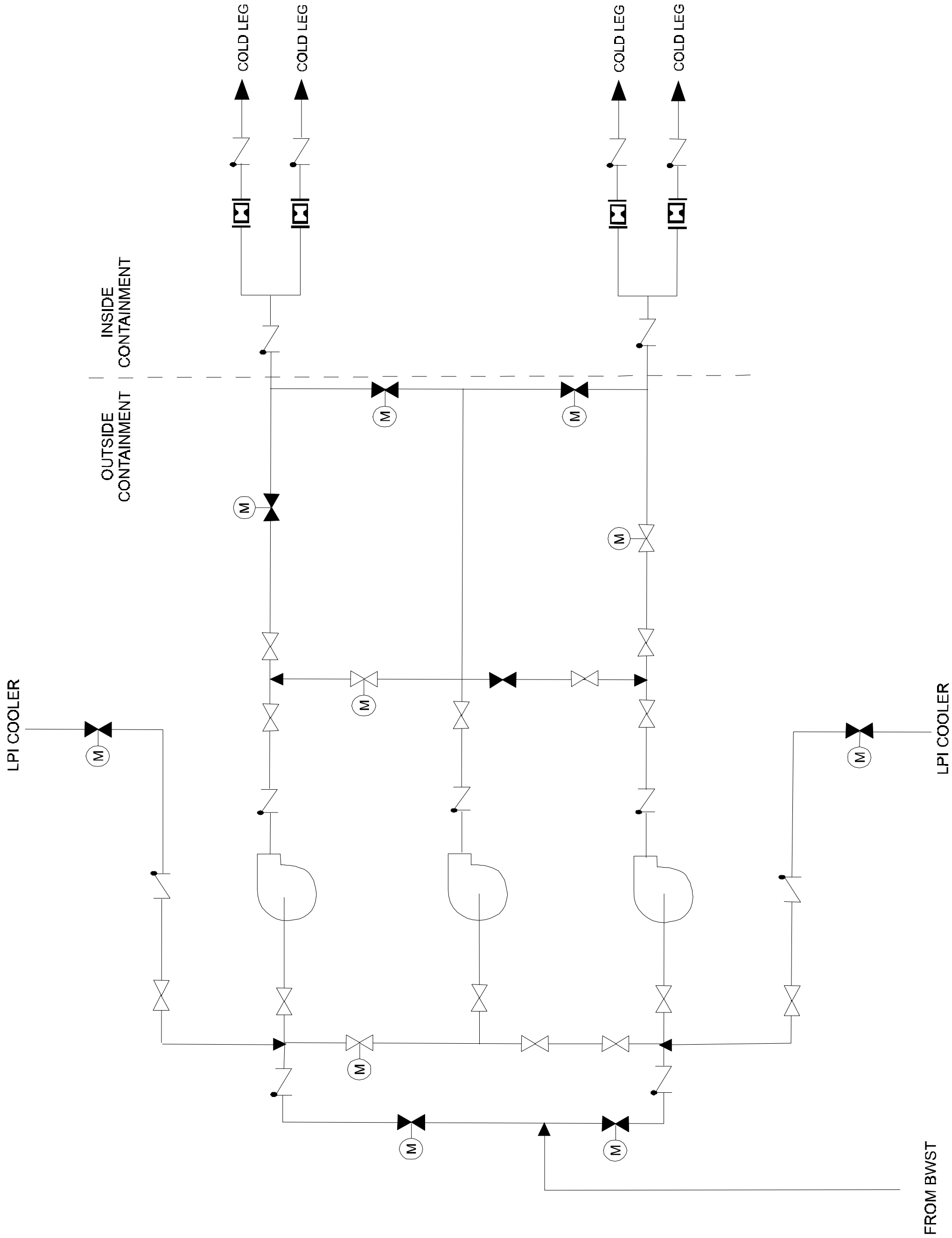


Figure 5.1
High Pressure Safety Injection System
(Example of Reporting Scope)

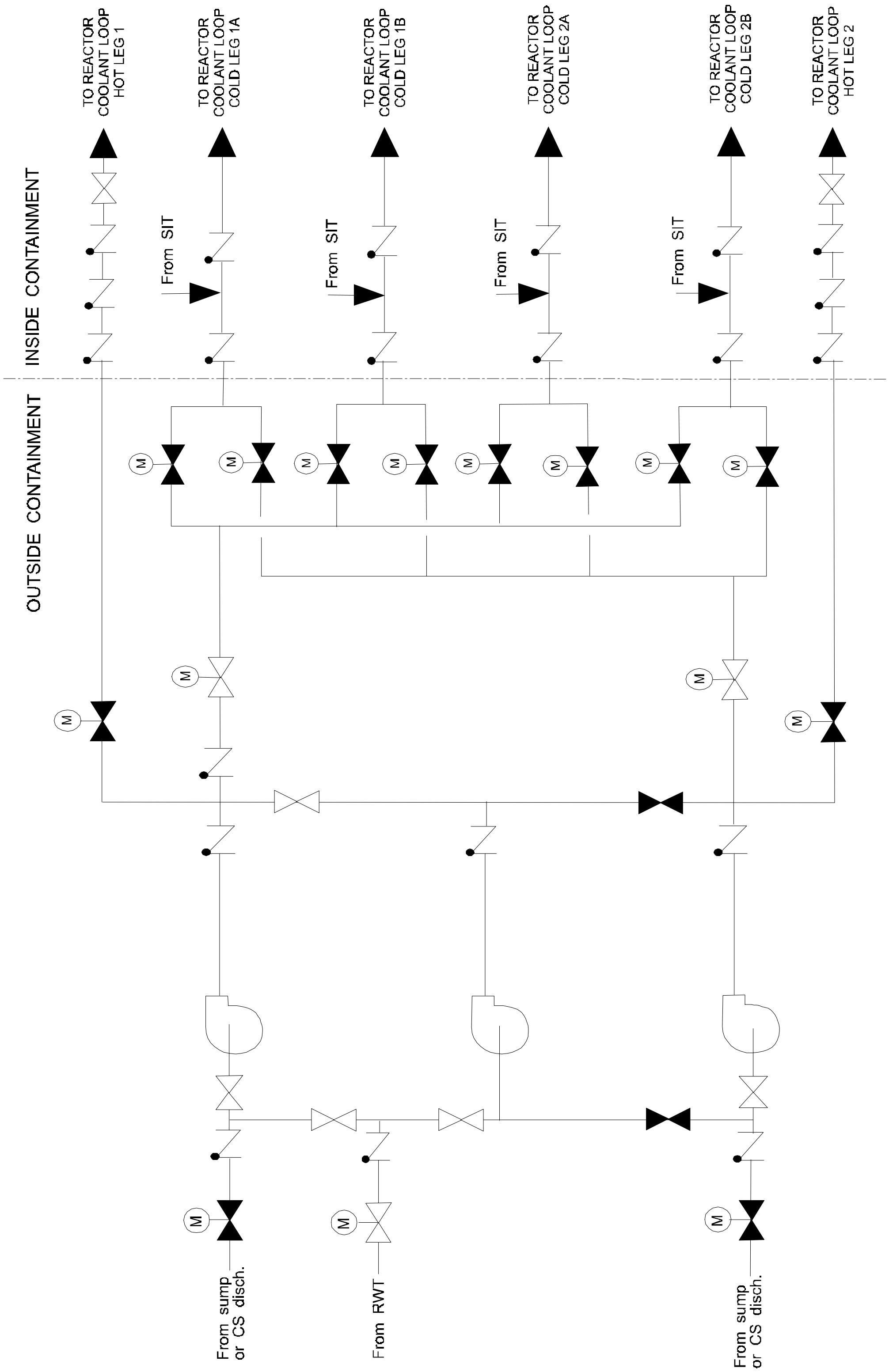


Figure 5.2
High Pressure Safety Injection System
(Example of Reporting Scope)

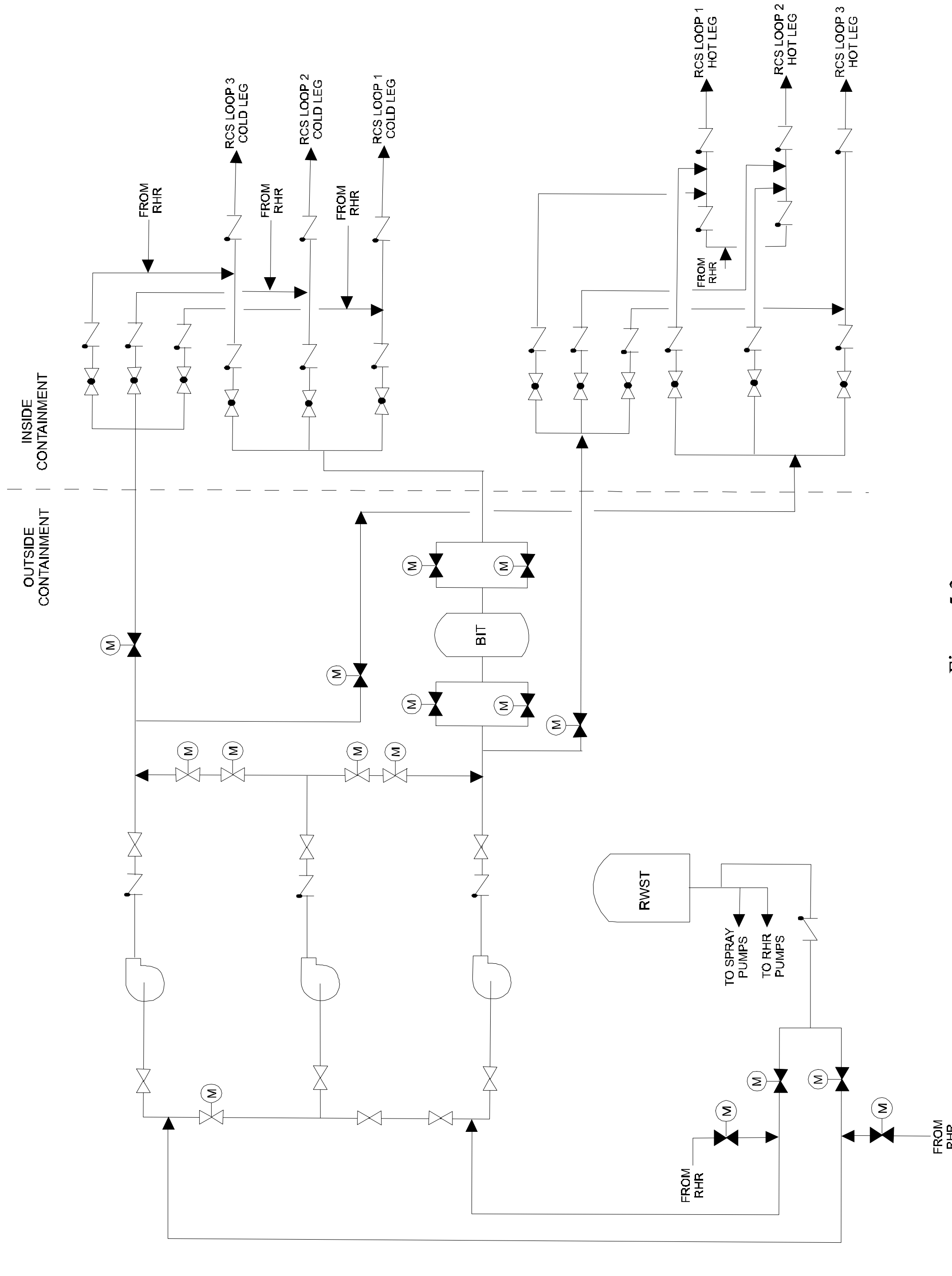


Figure 5.3
High Pressure Safety Injection System
(Example of Reporting Scope)

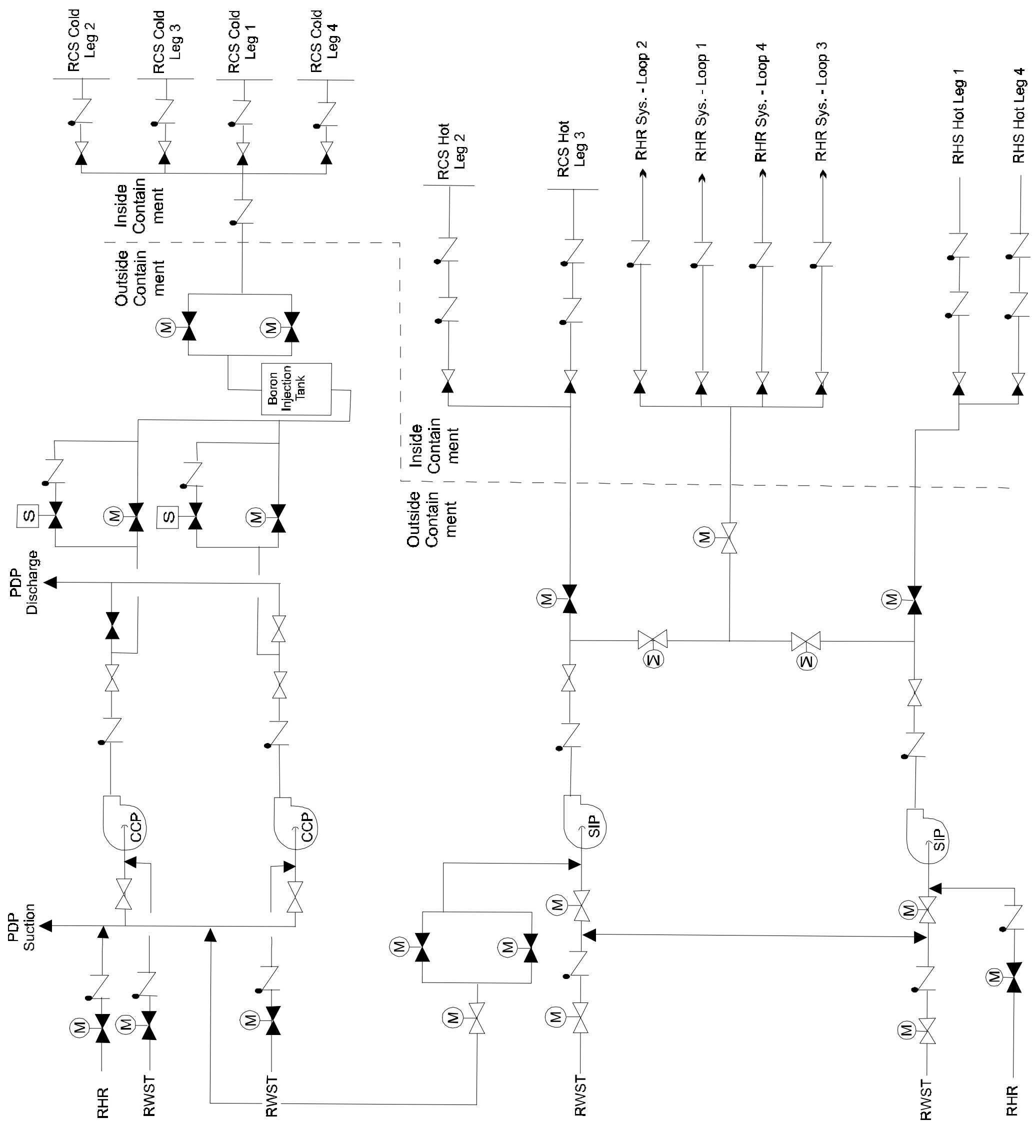


Figure 5.4
High Pressure Safety Injection System
(Example of Reporting Scope)

PWR Auxiliary Feedwater Systems

Definition and Scope

This section provides additional guidance for reporting the performance of PWR auxiliary feedwater (AFW) or emergency feedwater (EFW) systems. The AFW system provides decay heat removal via the steam generators to cool down and depressurize the reactor coolant system following a reactor trip. The AFW system is assumed to be required for an extended period of operation during which the initial supply of water from the condensate storage tank is depleted and water from an alternative water source (e.g., the service water system) is required. Therefore components in the flow paths from both of these water sources are included; however, the alternative water source (e.g., service water system) is not included.

The function monitored for the indicator is:

- the ability of the AFW system to take a suction from the primary water source (typically, the condensate storage tank) or from an emergency source (typically, a lake or river via the service water system) and inject into at least one steam generator at rated flow and pressure.

Some plants have a startup feedwater pump that requires a manual actuation. Startup feedwater pumps are not included in the scope of the AFW system for this indicator.

Figures 6.1 through 6.3 show some typical AFW system configurations, indicating the components for which train unavailability is monitored. Plant-specific design differences may require other components to be included.

Train Determination

The number of trains is determined primarily by the number of parallel pumps in the AFW system, not by the number of injection lines. For example, a system with three AFW pumps is defined as three-train system, whether it feeds two, three, or four injection lines, and regardless of the flow capacity of the pumps.

Figure 6.1 illustrates a three-pump, two-steam generator plant that features redundant flow paths to the steam generators. This system is a three-train system. (If the system had only one motor-driven pump, it would be a two-train system.) The turbine-driven pump train does not share motor-operated isolation valves with the motor-driven pump trains in this design.

Another three-pump, two-steam generator design is shown in Figure 6.2. This is also a three-train system; however, in this design, the isolation and regulating valves in the motor-driven pump trains are also included in the turbine-driven pump train.

A three-pump, four-steam generator design is shown in Figure 6.3. In this design, either motor-driven pump can supply each steam generator through a common header. The turbine-driven pump can supply each steam generator through a separate header. The turbine-driven and motor-driven pump trains do not share the air-operated regulating valves in this design. This is a three train system. Three-steam generator designs may be arranged similar to Figure 6.3.

Clarifying Notes

Some AFW components, may be included in the scope of more than one train. For example, one set of flow regulating valves and isolation valves in a three-pump, two-steam generator system (as in Figure 6.2) are included in the motor-driven pump train with which they are electrically associated, but they are also included (along with the redundant set of valves) in the turbine-driven pump train. In these instances, the effects of testing or failure of the valves should be reported in both affected trains.

Similarly, when two trains provide flow to a common header, such as in Figure 6.3, the effect of isolation or flow regulating valve failures in paths connected to the header should be considered in both trains.

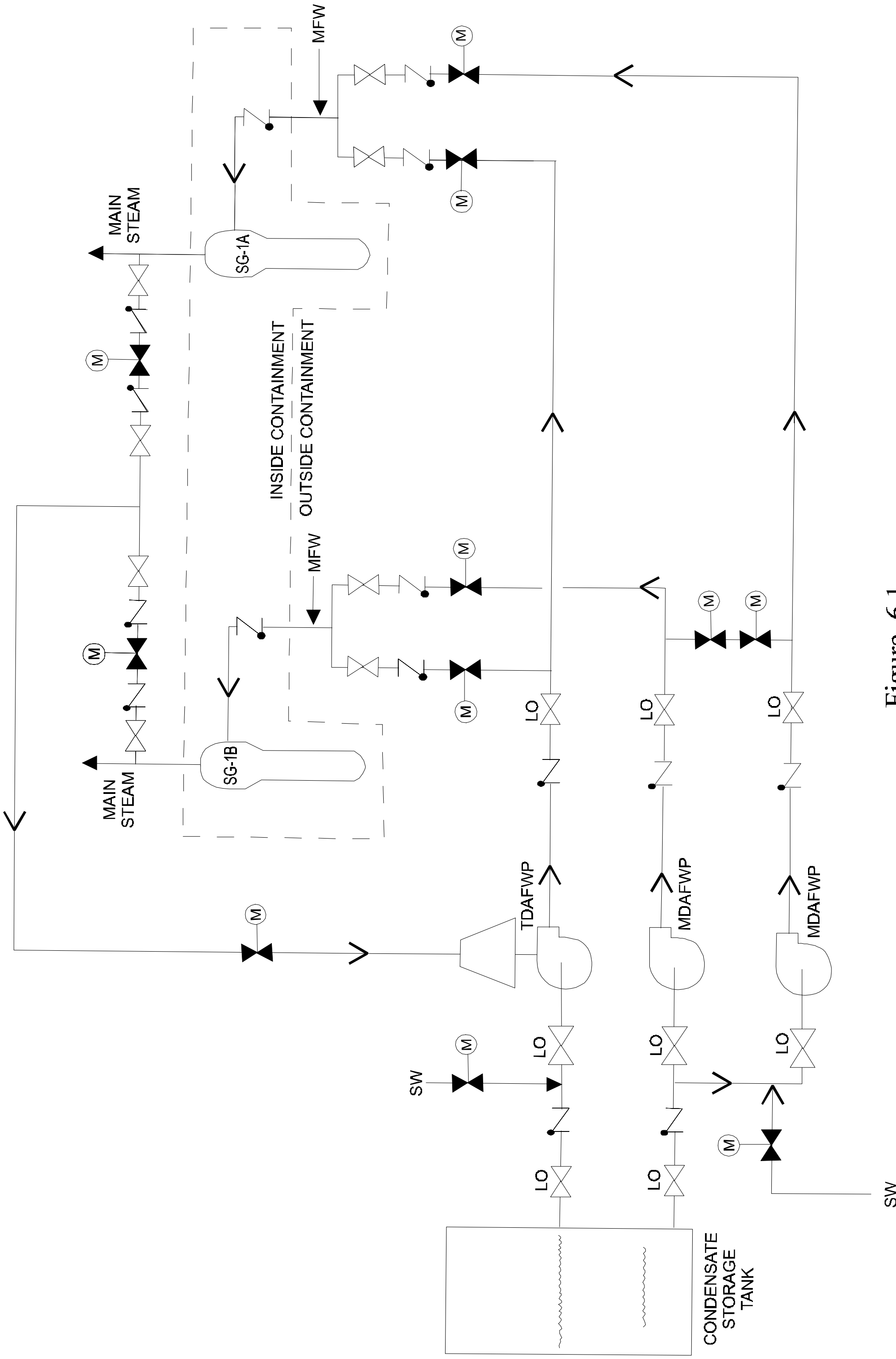


Figure 6.1
Auxiliary Feedwater System
(Example of Reporting Scope)

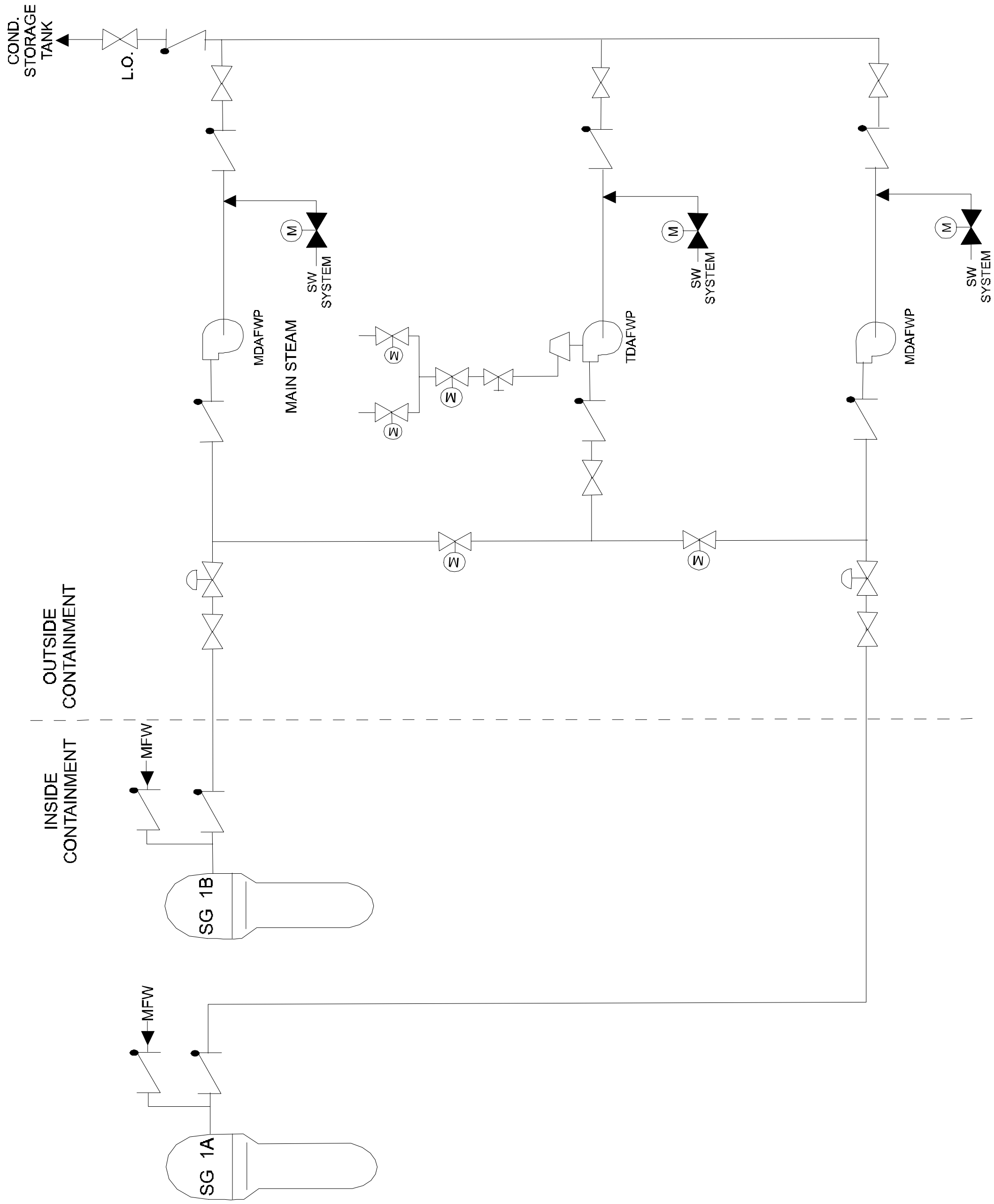


Figure 6.2
Auxiliary Feedwater System
(Example of Reporting Scope)

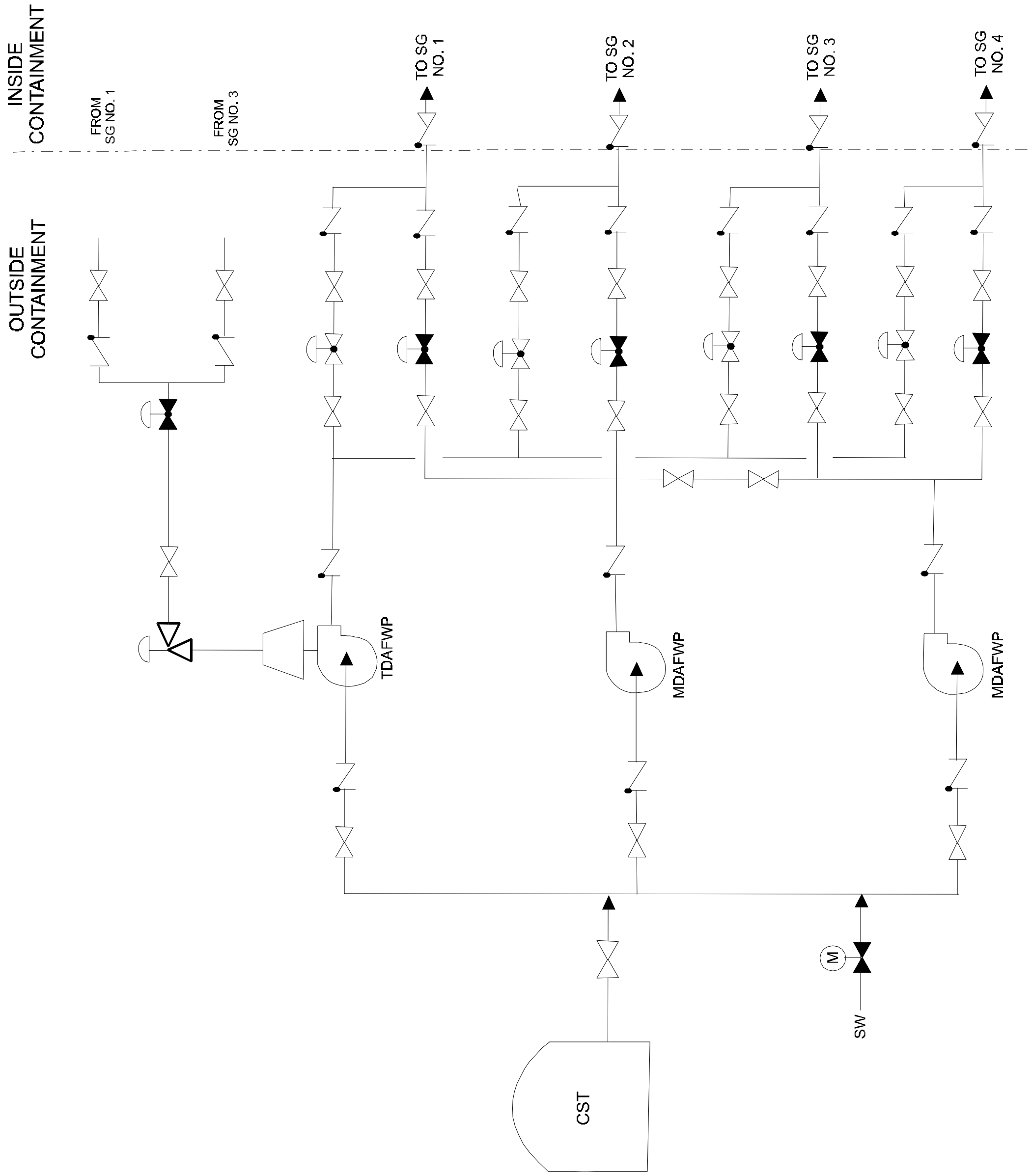


Figure 6.3
Auxiliary Feedwater System
(Example of Reporting Scope)

PWR Residual Heat Removal System

Definition and Scope

This section provides additional guidance for reporting the performance of the PWR residual heat removal (RHR) system for post-accident recirculation and shutdown cooling modes of operation. In the event of a loss of reactor coolant inventory, the post-accident recirculation mode is used to cool and recirculate water from the containment sump following depletion of RWST inventory. The shutdown cooling function is used to remove decay heat from the primary system following any transient requiring normal long-term heat removal from the reactor vessel.

The functions monitored for this indicator are:

- the ability of the RHR system to take a suction from the containment sump, cool the fluid, and inject at low pressure into the RCS, and

- the ability of the RHR system to remove decay heat from the reactor during a normal unit shutdown for refueling or maintenance.

Figures 7.1 and 7.2 show generic schematics with the RHR system in the recirculation and shutdown cooling modes, respectively. The figures indicate the components for which train unavailability is monitored. Plant-specific design differences may require other components to be included.

Train Determination

The number of trains in the RHR system is determined by the number of parallel RHR heat exchangers capable of performing post-accident heat removal or shutdown cooling. The following discussion demonstrates train determination for various generic system designs.

Figure 7.1 and 7.2 illustrate a common RHR system (for post-accident recirculation and shutdown cooling modes) which incorporates two pumps and two heat exchangers arranged so that each heat exchanger can be supplied by one pump. This is a two-train RHR system.

Clarifying Notes

Some components are used to provide more than one function of RHR. If a component cannot perform as designed, rendering its associated train incapable of meeting one or both of the monitored functions, then the train is considered to be failed. Unavailable hours (if the train was required to be available for service) would be reported as a result of the component failure.

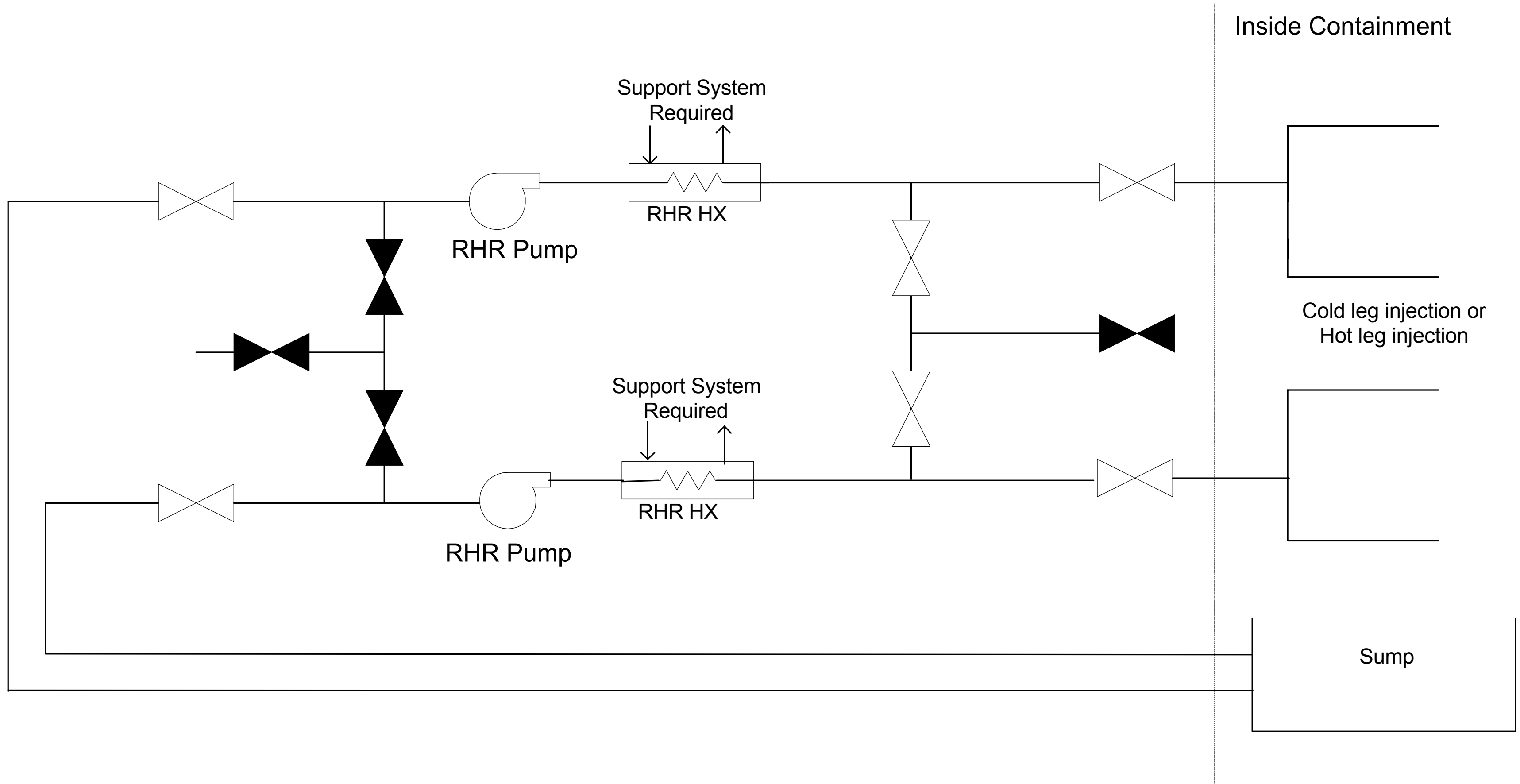


Figure 7.1 – Recirculation Mode – two trains (both source and injection)
Example of reporting Scope, PWR RHR System

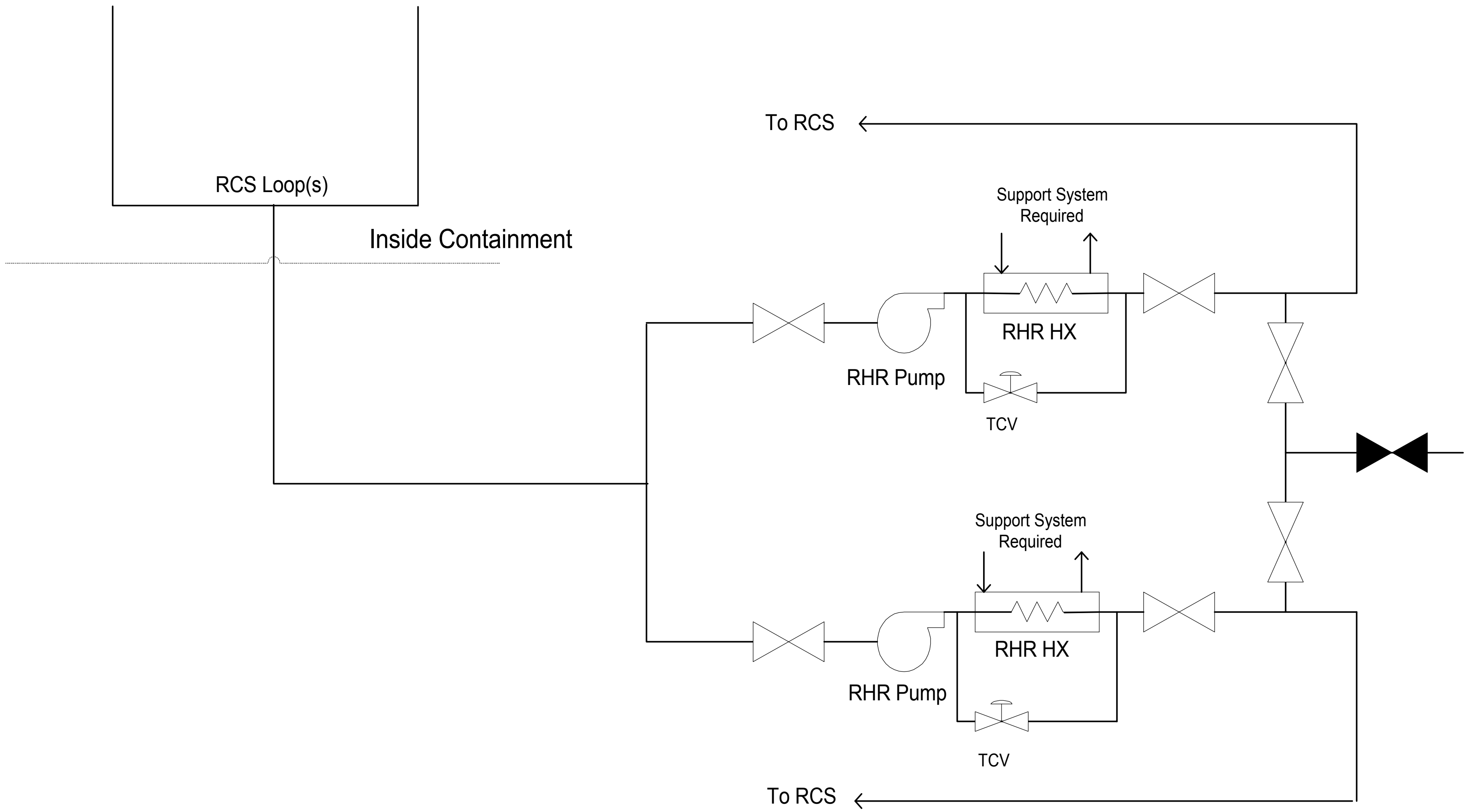


Figure 7.2 Shutdown Cooling Mode
(Example of Reporting Scope, PWR RHR System

SAFETY SYSTEM FUNCTIONAL FAILURES

Purpose

This indicator monitors events or conditions that alone prevented, or could have prevented, the fulfillment of the safety function of structures or systems that are needed to:

(a) Shut down the reactor and maintain it in a safe shutdown condition;
(b) Remove residual heat;
(c) Control the release of radioactive material; or
(d) Mitigate the consequences of an accident.

Indicator Definition

The number of events or conditions that alone prevented, or could have prevented, the fulfillment of the safety function of structures or systems in the previous four quarters.

Data Reporting Elements

The following data is reported for each reactor unit:

- the number of safety system functional failures during the previous quarter

Calculation

unit value = number of safety system functional failures in previous four quarters

Definition of Terms

Safety System Function Failure (SSFF) is any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to:

(A) Shut down the reactor and maintain it in a safe shutdown condition;
(B) Remove residual heat;
(C) Control the release of radioactive material; or
(D) Mitigate the consequences of an accident.

The indicator includes a wide variety of events or conditions, ranging from actual failures on demand to potential failures attributable to various causes, including environmental qualification, seismic qualification, human error, design or installation errors, etc. Many SSFFs do not involve actual failures of equipment.

Because the contribution to risk of the structures and systems included in the SSFF varies considerably, and because potential as well as actual failures are included, it is not possible to assign a risk-significance to this indicator. It is intended to be used as a possible precursor to more important equipment problems, until an indicator of safety system performance more directly related to risk can be developed.

Clarifying Notes

The definition of SSFFs is identical to the wording of the current revision to 10 CFR 50.73(a)(2)(v). Because of overlap among various reporting requirements in 10 CFR 50.73, some events or conditions that result in safety system functional failures may be properly reported in accordance with other paragraphs of 10 CFR 50.73, particularly paragraphs (a)(2)(i), (a)(2)(ii), and (a)(2)(vii). An event or condition that meets the requirements for reporting under another paragraph of 10 CFR 50.73 should be evaluated to determine if it also prevented the fulfillment of a safety function. Should this be the case, the requirements of paragraph (a)(2)(v) are also met and the event or condition should be included in the quarterly performance indicator report as an SSFF. The level of judgement for reporting an event or condition under paragraph (a)(2)(v) as an SSFF is a reasonable expectation of preventing the fulfillment of a safety function.

In the past, LERs may not have explicitly identified whether an event or condition was reportable under 10 CFR 50.73(a)(2)(v) (i.e., all pertinent boxes may not have been checked). It is important to ensure that the applicability of 10 CFR 50.73(a)(2)(v) has been explicitly considered for each LER considered for this performance indicator.

NUREG-1022: Unless otherwise specified in this guideline, guidance contained in the latest revision to NUREG-1022, "Event Reporting Guidelines, 10CFR 50.72 and 50.73," that is applicable to reporting under 10 CFR 50.73(a)(2)(v), should be used to assess reportability for this performance indicator.

Planned Evolution for maintenance or surveillance testing: NUREG-1022, Revision 1, page 70 states, "The following types of events or conditions generally are not reportable under these criteria:…Removal of a system or part of a system from service as part of a planned evolution for maintenance or surveillance testing…"

The word "planned" is defined as follows:

> "Planned" means the activity is undertaken voluntarily, at the licensee's discretion, and is not required to restore operability or for continued plant operation.

A single event or condition that affects several systems: counts as only one failure.

Multiple occurrences of a system failure: the number of failures to be counted depends upon whether the system was declared operable between occurrences. If the licensee knew that the problem existed, tried to correct it, and considered the system to be operable, but the system was subsequently found to have been inoperable the entire time, multiple failures will be counted. But if the licensee knew that a potential problem existed and declared the system inoperable, subsequent failures of the system for the same problem would not be counted as long as the system was not declared operable in the interim. Similarly, in situations where the licensee did not realize that a problem existed (and thus could not have intentionally declared the system inoperable or corrected the problem), only one failure is counted.

Additional failures: a failure leading to an evaluation in which additional failures are found is only counted as one failure; new problems found during the evaluation are not counted, even if the causes or failure modes are different. The intent is to not count additional events when problems are discovered while resolving the original problem.

Engineering analyses: events in which the licensee declared a system inoperable but an engineering analysis later determined that the system was capable of performing its safety function are not counted**, even if the system was removed from service to perform the analysis**.

Reporting date: the date of the SSFF is the Report Date of the LER.

Frequently Asked Questions

ID Question

8 Does the functional area of Containment Integrity include systems and equipment associated with secondary containment? Specifically, is standby Gas Treatment an included system? If secondary containment is included, do we also include systems like Hi/Lo Volume purge (BWR-6) or Fuel Bldg. Filtration systems for designs that have a separate system for fuel building (a functional equivalent to secondary containment). Would support systems like annulus pressure control be included?

Response

Yes, Standby Gas Treatment is included. The reportability guidelines of NUREG-1022 Revision 1, Event Reporting Guidelines, 10 CFR 50.72 and 50.73, should be used. If the situation is reportable per 10CFR50.73 (a)(2)(v) it should be counted as a SSFF. The other systems identified in the question have the potential to be reported under 10 CFR 50.73 (a)(2)(v) and should be evaluated accordingly.

ID Question

9 Should Appendix R issues be covered by this indicator (SSFF) or is it already covered/better covered by the fire protection inspection procedure.

Response

This indicator monitors events or conditions that alone prevented, or could have prevented, the fulfillment of the safety function of structures or systems that are needed to a) shut down the reactor and maintain it in a safe shutdown condition, b) remove residual heat, c) control the release of radioactive material, or d) mitigate the consequences of an accident. Appendix R issues have the potential to affect the safety functions of structures and systems and should be evaluated accordingly. The reportability guidelines of NUREG-1022 Revision 1, should be used. If the situation is reportable per 10CFR50.73 (a)(2)(v) it should be counted as a SSFF.

ID Question

10 For those cases where a Tech Spec required action places a system in an inoperable status, is it necessary/required to call this a SSFF? It seems like it should not be counted as a SSFF because the systems can perform their safety function.

Response

If the system, upon receipt of a demand signal, would have functioned, then it would not count as a SSFF. The reportability guidelines of NUREG-1022 Revision 1, Event Reporting Guidelines, 10 CFR 50.72 and 50.73, should be used. If the situation is reportable per 10CFR50.73 (a)(2)(v) it should be counted as a SSFF.

ID	Question
143	In our plant, RCIC is not a safety system and functionally, it provides high pressure makeup which can also be provided by HPCI. For these reasons, RCIC functional failures (as determined for the maintenance rule) are not reportable under 10CFR50.73 (a)(2)(v). Given the above, would RCIC functional failures ever be reported for NEI 99-02?

Response
No. The intention of NEI 99-02 is to report only those failures meeting the 10CFR50.73(a)(2)(v) reporting criteria as applied to a specific plant.

ID	Question
144	The guidance on SSFFs regarding reporting of multiple failures could be clearer. Is the intent that if there are multiple failures documented in one LER that each one (failure) be counted by the one report date? So that one report date may be tied to numerous failures?

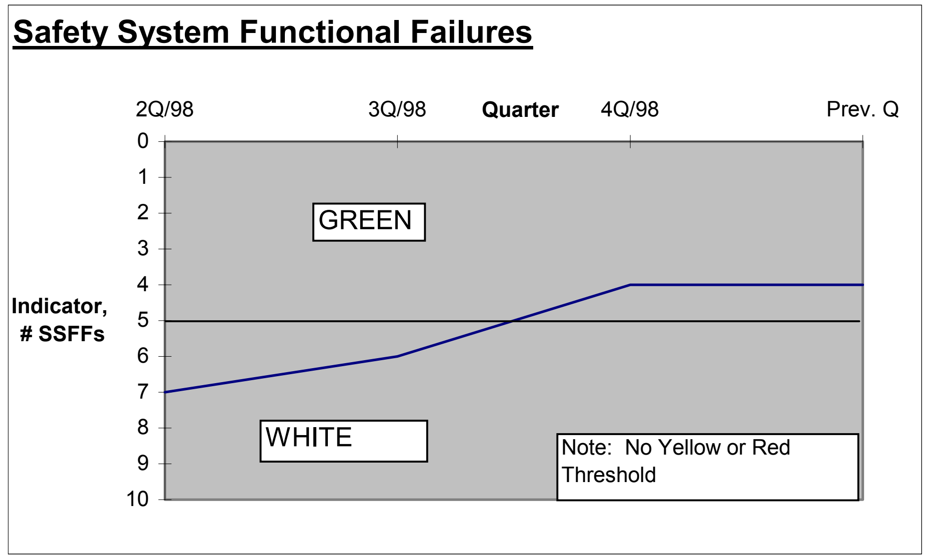
Response
Each individual SSFF counts.

Data Examples

Safety System Functional Failures

Quarter	2Q/98	3Q/98	4Q/98	1Q/98	2Q/98	3Q/98	4Q/98	Prev. Q
SSFF in the previous qtr	1	3	2	1	1	2	0	1
					2Q/98	3Q/98	4Q/98	Prev. Q
Indicator: Number of SSFs over 4 Qtrs					7	6	4	4

Threshold for PWRs	
Green	≤5
White	>5
Yellow	N/A
Red	N/A



2.3 BARRIER INTEGRITY CORNERSTONE

The purpose of this cornerstone is to provide reasonable assurance that the physical design barriers (fuel cladding, reactor coolant system, and containment) protect the public from radionuclide releases caused by accidents or events. These barriers are an important element in meeting the NRC mission of assuring adequate protection of public health and safety. The performance indicators assist in monitoring the functionality of the fuel cladding **and** the reactor coolant system. **There is currently no performance indicator for the containment barrier. The performance of this barrier is assured through the inspection program**.

There are **two** performance indicators for this cornerstone:

- Reactor Coolant System (RCS) Specific Activity
- RCS Identified Leak Rate

REACTOR COOLANT SYSTEM (RCS) SPECIFIC ACTIVITY

Purpose

This indicator monitors the integrity of the fuel cladding, the first of the three barriers to prevent the release of fission products. It measures the radioactivity in the RCS as an indication of functionality of the cladding.

Indicator Definition

The maximum monthly RCS activity in micro-Curies per gram (μCi/gm) dose equivalent Iodine-131 per the technical specifications, and expressed as a percentage of the technical specification limit.

Data Reporting Elements

The following data are reported for each reactor unit:

- maximum calculated RCS activity for each unit, in micro-Curies per gram dose equivalent Iodine-131, as required by technical specifications, for each month during the previous quarter (three values are reported).

- Technical Specification limit

Calculation

The indicator is calculated as follows:

$$\text{unit value} = \frac{\text{the maximum monthly value of calculated activity}}{\text{Technical Specification limit}} \times 100$$

Definitions of Terms

(Blank)

Clarifying Notes

This indicator is recorded monthly and reported quarterly.

The indicator is calculated using the same methodology, assumptions and conditions as for the Technical Specification calculation.

This indicator monitors the steady state integrity of the fuel-cladding barrier. Transient spikes in RCS Specific Activity following power changes, shutdowns and scrams may not provide a reliable indication of cladding integrity and should not be included in the monthly maximum for this indicator.

If in the entire month, plant conditions do not require RCS activity to be calculated, the quarterly report is noted as N/A for that month.

Frequently Asked Questions

ID Question

22 The Reactor Coolant System Specific Activity performance indicator is based upon a measurement of RCS activity in micro-Curies per gram dose equivalent Iodine-131. Our plant's measurement and associated technical specification are based upon micro-curies per gram total Iodine. What do we report for this performance indicator.

Response

RCS activity for this indicator is expressed as a percentage of the technical specification limit. The maximum monthly RCS activity and your technical specification limit should be reported on a common basis. In your case RCS activity and the technical specification limit should be reported in micro-Curies per gram total Iodine.

ID Question

23 Technical Specifications (TS) provide a frequency of reactor coolant sampling and analysis. If sampling and analysis is conducted on a more frequent basis, do you only report the analysis conducted at the TS frequency, or do you consider all the analyzed samples.

Response

All analyzed samples obtained during steady state power operation should be considered in reporting the monthly maximum.

1

ID	Question
24	Are RCS sample results determined during shutdowns, using the technical specification methodology, required to be reported even if the plant is in a mode that does not require the sample. Administratively, the plant may be in a plant condition that requires the sample and analysis, although it is not required by Technical Specifications.
	Response
	No.

2

ID	Question
25	PWRs can expect RCS Specific Activity spikes following routine shutdowns. Are these spikes to be counted as the monthly maximum?
	Response
	The indicator definition refers to the Technical Specifications' maximum monthly activity limit. The basis for this indicator is to monitor steady state power operations. Therefore, do not count short periods of non-steady-state or non-power operation because they may not equate to the current condition of the fuel cladding.

3

ID	Question
72	Application of Technical Specification Limit Two of the performance indicators for the barrier integrity cornerstone use "technical specification limit" in the calculation. They are RCS specific activity and leakage. There are two situations where a plant could be operating with a more restrictive limit for RCS specific activity and/or RCS leakage than the "technical specification limit". One situation is where the Facility Operating License (FOL) contains a condition that specifies a more restrictive limit. The second situation is where the licensee has administratively implemented a more restrictive limit to maintain operability as described in Generic Letter 91-18. The guidance as currently worded would always use whatever the technical specification limit is and ignore any more restrictive limits. Is that the intent and is that appropriate?
	Response
	The circumstances of each situation are different and should be identified to the NRC so that a determination can be made as to whether alternate data reporting can be used in place of the data called for in the guidance.

4

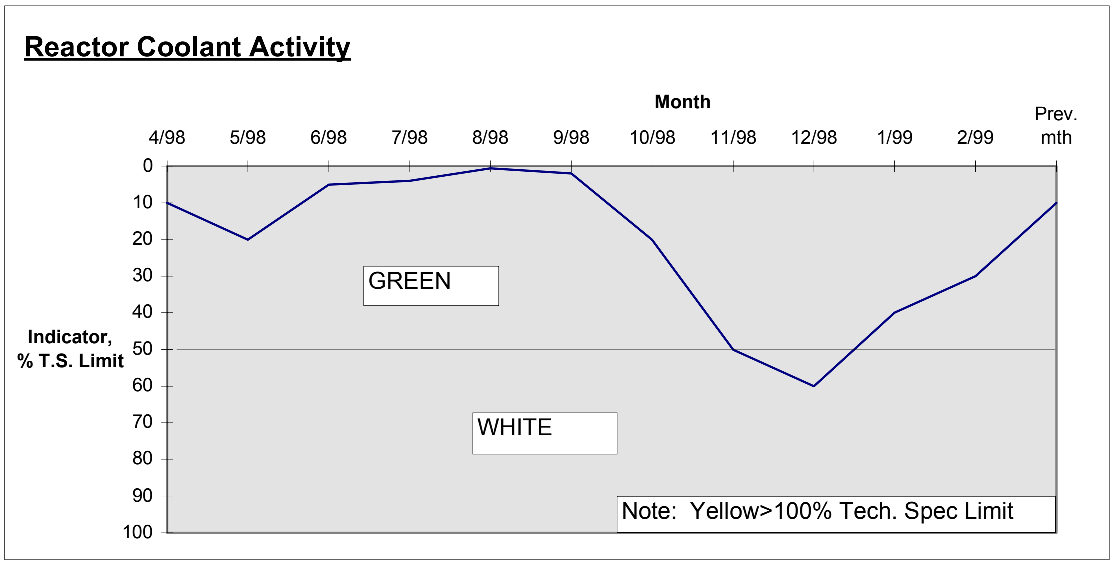
ID	Question
84	Reporting significant digits How many significant digits should be carried for the dose equivalent I-131 maximum value? Although NEI 99-02, has guidance concerning the number of decimal places in the final reported number (percentage of TS limits), it isn't clear how many significant digits to retain in the raw data.
	Response
	In general, the data element input forms allow data to be entered to a level of significance that is one significant figure greater than the resulting performance indicator. In some cases the input forms restrict the level of significance even further due to recognized limitations in reporting accuracy (e.g., compensatory hours are limited to two significant figures even though the PI calculation would allow input to four significant figures). In all cases, however, the accuracy of the raw data should be considered.

5

Data Examples

Reactor Coolant System Activity (RCSA)

	4/98	5/98	6/98	7/98	8/98	9/98	10/98	11/98	12/98	1/99	2/99	Prev. mth
Indicator, % of T.S. Limit	10	20	5	4	0.5	2	20	50	60	40	30	10
Max Activity µCi/gm I-131 Equivaler	0.1	0.2	0.05	0.04	0.005	0.02	0.2	0.5	0.6	0.4	0.3	0.1
T.S Limit	1	1	1	1	1	1	1	1	1	1	1	1
Thresholds	Green	≤ 50% T.S. limit										
	White	> 50% T.S limit										
	Yellow	>100% T.S. limit										



REACTOR COOLANT SYSTEM LEAKAGE

Purpose

This indicator monitors the integrity of the RCS pressure boundary, the second of the three barriers to prevent the release of fission products. It measures RCS Identified Leakage as a percentage of the technical specification allowable Identified Leakage to provide an indication of RCS integrity.

Indicator Definition

The maximum RCS Identified Leakage in gallons per minute each month per the technical specifications and expressed as a percentage of the technical specification limit.

Data Reporting Elements

The following data are required to be reported each quarter:

- The maximum RCS Identified Leakage calculation for each month of the previous quarter (three values).
- Technical Specification limit

Calculation

The unit value for this indicator is calculated as follows:

$$\text{unit value} = \frac{\text{the maximum monthly value of identified leakage}}{\text{Technical Specification limiting value}} \times 100$$

Definition of Terms

RCS Identified Leakage as defined in Technical Specifications.

Clarifying Notes

This indicator is recorded monthly and reported quarterly.

Normal steam generator tube leakage is included in the unit value calculation if required by the plant's Technical Specification definition of RCS identified leakage.

For those plants that do not have a Technical Specification limit on Identified Leakage, substitute RCS Total Leakage in the Data Reporting Elements.

All calculations of RCS leakage that are **computed in accordance with the calculational methodology requirements of the Technical Specifications are** counted in this indicator.

If in the entire month, plant conditions do not require RCS leakage to be calculated, the quarterly report is noted as N/A for that month.

Frequently Asked Questions

ID Question

79 Use of Total Leakage Value

We have implemented ITS and have TS definitions for Reactor Coolant leakage. We have a defined limit for "Total Leakage" (25 gpm) and "Un-identified Leakage" (5 gpm). We do not have a specified limit for "Identified Leakage". You can infer directly from our TS limits an identified leakage limit of no more than 20 gpm (25 gpm total minus 5 gpm the amount of leakage we call "unidentified leakage"). Using this approach, the Tech Spec limit for the PI could vary between 25 and 20 gpm depending on the amount of "un-identified leakage" we have. Why can't we use the 20-25 gpm as the limit for the PI as can others who do not have a total leakage TS limit? The best indicator of barrier performance seems to be "Un-identified Leakage" rather than identified leakage. Unidentified is the amount of leakage falling outside designed collection systems. Trending the percentage of "Un-identified Leakage" presents a more clear picture of how well a plant is maintaining their Reactor Coolant system. It is also very well defined. It also seems to meet the SECY objective to be an indication of the "probability of more catastrophic failure potential" as specified in para C.4.5. Why is this PI concerned with identified and not Unidentified leakage?

Response

NEI 99-02 states that total leakage will be used for those plants that do not have a Technical Specification limit on Identified Leakage. This is considered acceptable to provide consistency in reporting for those plants. Not all plants track total leakage. Identified leakage was chosen as capturing most of the allowed leakage.

ID Question

135 Our Tech Spec requires test/evaluation of primary system leakage 5 times per week. The Tech Spec limits (LCOs) are 1 gpm unidentified and 10 gpm Total. The Reactor Operators perform a daily calculation of RCS leakage based on mass flow differences, which is equivalent to Total leakage from the RCS. The unidentified RCS leak rate is also determined daily based on the daily total but using a weekly calculated Identified leak rate and subtracting it from the daily total leak rate. Based on the NEI 99-02 guideline, we would use the weekly-calculated identified leak rate? Is this correct? This leak rate is sometimes calculated more frequently due to increases in leakage during the week. Many times the identified leak rate is zero. We can look at a months worth of calculations (usually 4) and see which one is the highest and report that. Is that the intent of the PI?

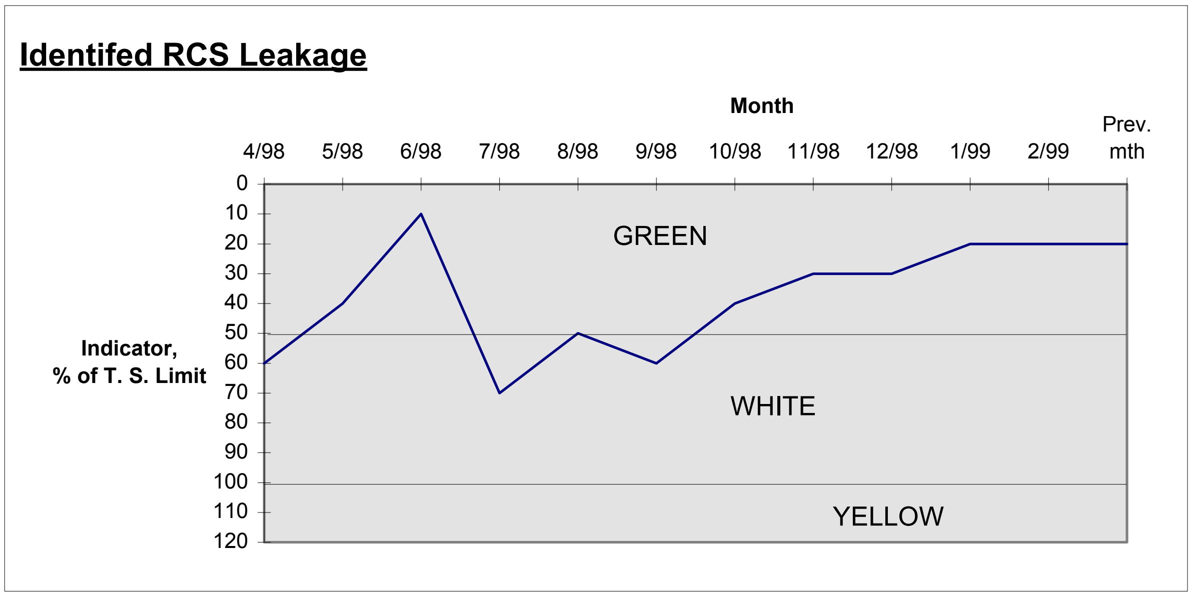
Response

Report the highest monthly value computed in accordance with the calculational methodology requirements of the Technical Specifications.

Data Examples

Reactor Coolant System Identified Leakage (RCSL)

	4/98	5/98	6/98	7/98	8/98	9/98	10/98	11/98	12/98	1/99	2/99	Prev. mth
Indicator %T.S. Value	60	40	10	70	50	60	40	30	30	20	20	20
Identified Leakage (gpm)	6	4	1	7	5	6	4	3	3	2	2	2
TS Value (gpm)	10	10	10	10	10	10	10	10	10	10	10	10
Threshold												
Green	≤50% TS limit											
White	>50% TS limit											
Yellow	>100%TS limit											
Data collected monthly, reported quarterly												



2.4 EMERGENCY PREPAREDNESS CORNERSTONE

The objective of this cornerstone is to ensure that the licensee is capable of implementing adequate measures to protect the public health and safety during a radiological emergency. Licensees routinely assess and refine their emergency plans through Emergency Response Organization (ERO) participation in drills, exercises, actual events, training, and subsequent problem identification and resolution. Employees are trained to ensure that the plan can be effectively implemented during an emergency. Drill **and** exercise performance, ERO **drill** participation and reliability of the alert and notification system contribute to reasonable assurance that the licensee has an effective emergency preparedness program. These performance indicators measure onsite programs. Offsite programs are evaluated by FEMA.

The protection of public health and safety is assured by a defense in depth philosophy that relies on: safe reactor design and operation, the operation of mitigation features and systems, a multi-layered barrier system to prevent fission product release, and emergency preparedness.

The onsite performance indicators monitored by this section are:

- Drill/Exercise performance,
- Emergency Response Organization Drill Participation,
- Alert and Notification System Reliability

DRILL/EXERCISE PERFORMANCE

Purpose

This indicator monitors timely and accurate licensee performance in drills **and** exercises when presented with opportunities for classification of emergencies, notification of offsite authorities, and development of protective action recommendations (PARs). It is the ratio, in percent, of timely and accurate performance of those actions to total opportunities.

Indicator Definition

The percentage of all drill, exercise, and actual opportunities that were performed timely and accurately during the previous eight quarters.

Data Reporting Elements

The following data are required to calculate this indicator:

- the number of drill, exercise, and actual event opportunities during the previous quarter.
- the number of drill, exercise, and actual event opportunities performed timely and accurately during the previous quarter.

The indicator is calculated and reported quarterly. (See clarifying notes)

Calculation

The site average values for this indicator are calculated as follows:

$$\left[\frac{\text{\# of timely \& accurate classifications, notifications, \& PARs from DE \& AEs * during the previous 8 quarters}}{\text{The total opportunities to perform Classifications, Notifications \& PARs during the previous 8 quarters}}\right] \times 100$$

*DE & AEs = Drills, Exercises, and Actual Events

Definition of Terms

Opportunities should include multiple events during a single drill or exercise (if supported by the scenario) or actual event, as follows:

- each expected classification should be included
- notification includes notifications made to the state and/or local government authorities for initial emergency classification, upgrade of emergency class, initial PARs and changes in PARs (periodic follow up notifications and briefings when the classification or PARs have not changed are not included)
- PAR includes the initial PAR and any PAR change

Timely means:

- classifications are made consistent with the goal of 15 minutes once plant parameters reach an Emergency Action Level (EAL)
- PARs are developed within 15 minutes of data availability.
- offsite notifications are initiated (verbal contact) within 15 minutes of event classification and/or PAR development

Accurate means notification, classification, and PAR appropriate to the event as specified by the approved plan and implementing procedures.

Clarifying Notes

While actual event opportunities are included in the performance indicator data reporting, the NRC will also inspect licensee response to all actual events.

As a minimum, actual emergency declarations and evaluated exercises are to be included in this indicator. In addition, other simulated emergency events that the licensee formally assesses for performance of classification, notification or PAR development opportunities will be included in this indicator(opportunities cannot be removed from the indicator due to poor performance).

The licensee should identify, in advance, drills, exercises and other performance enhancing experiences in which DEP opportunities will be formally assessed. This can be done by memo, but must be available for NRC review.

A drill does not have to include all ERO facilities to be counted in this indicator. A drill is of appropriate scope for a single ERO specific facility if it reasonably simulates the interaction with one or more of the following facilities, as appropriate:

- the control room,
- the Technical Support Center (TSC),
- the Operations Support Center,
- the Emergency Operations Facility (EOF),
- field monitoring teams,
- damage control teams, and
- offsite governmental authorities.

Operating shift simulator evaluations may be included in this indicator only when the scope requires classification. Notifications and PARs may be included in this indicator if they are performed to the point of filling out the appropriate forms and demonstrating sufficient knowledge to perform the actual notification. However, there is no intent to disrupt ongoing operator qualification programs. Appropriate operator training evolutions should be included in the indicator only when emergency preparedness aspects are consistent with training goals.

Some licensees have specific arrangements with their State authorities that provide for different notification requirements than those prescribed by the performance indicator, e.g., within one hour, not 15 minutes. In these instances the licensee should determine success against the specific state requirements.

Classification is expected to be made promptly following indication that the conditions have reached an emergency threshold in accordance with the licensee's EAL scheme. With respect to classification of emergencies, the 15 minute goal is a reasonable period of time for assessing and classifying an emergency once indications are available to control room operators that an EAL has been exceeded. Allowing a delay in classifying an emergency up to 15 minutes will have minimal impact upon the overall emergency response to protect the public health and safety. The 15-minute goal should not be interpreted as providing a grace period in which a licensee may attempt to restore plant conditions and avoid classifying the emergency.

<u>Frequently Asked Questions</u>

ID Question

26 <u>Opportunities</u>

How many opportunities per year for evaluating the performance of the Control Room crews are typically available?

Response

This will vary depending on the design and structure of the operator training program and the size of the staff. For example, at a single unit plant with 5 operating crews, there are usually about 8 simulator training cycles. Ostensibly, any of these cycles could include opportunities. For estimation purposes, it was assumed that two cycles per year contain a classification and notification opportunity, which results in a total of 20 per year. Additional opportunities could be presented in other parts of the drill/exercise program.

1

ID Question

27 Opportunities

Does a tabletop drill count for opportunities?

Response

The definition of table-top drill is not clear. However, the licensee has the latitude to include opportunities in the PI as long as the drill (in whatever form) simulates the appropriate level of inter-facility interaction as described in NEI 99-02. Once identified, opportunities cannot be removed from the indicator due to poor performance.

2

ID Question

28 Opportunities

For an actual event there may be many non-emergency events that require evaluation against the EALs. If this evaluation does not result in a classification, does the actual event count as an opportunity?

Response

No it doesn't count as an opportunity. Opportunities begin when a classification is made.

3

ID Question

29 Opportunities

How do you count opportunities for PARs and notifications associated with PARs?

Response

The development of an initial PAR and any changes to the PAR (usually no more than one or two follow-up changes due to wind shift or dose assessment) are to be counted. The notification associated with the PAR is counted separately: e. g., an event triggering a GE classification would represent a total of 4 opportunities: 1 for classification of the GE, 1 for notification of the GE to the State and/or local government authorities, 1 for development of a PAR and 1 for notification of the PAR. NEI 99-02 defines the term Opportunity.

4

ID Question

30 Opportunities

Could it be implied that for each classification opportunity, there may be several associated notification opportunities due to the need to notify several different State/local authorities?

Response

For each classification opportunity, there is only one associated notification opportunity even if several different State/local authorities need to be notified.

5

ID Question

31 Evaluation

Would the evaluators for drills or exercises have to be trained in order to assess opportunities correctly?

Response

Qualifications or required training for drill/exercise evaluators was not specified because this has not been a problem. There is a good history of competent exercise evaluation by licensees. However, it would be expected that evaluators be knowledgeable of the performance area they evaluate and with the guidance of NEI 99-02 regarding the EP cornerstone.

6

ID Question

32 Drills/Exercises

Why is there not a specified number of facility type drills? a utility could do 60 simulator drills and no EOF drills

Response

This concern is addressed through the Emergency Response Organization Drill Participation (ERO) PI, which would show decreasing performance should a licensee go down this path.

1

ID Question

33 Drills/Exercises

How does this performance indicator evaluate the difficulty of the drill/exercise?

Response

In general, PI's are a summary indication of the status of a program element. They are not used to evaluate the details of performance, rather they indicate the need to evaluate the details of performance. This PI was not designed to quantify the difficulty of scenarios. However, NRC inspectors will observe drills and the biennial exercise. If scenarios are inadequate to test the emergency plan, regulatory action may be taken in accordance with Appendix E to 10 CFR 50, Section IVF.f.

2

ID Question

34 Evaluation

If the ERO fails to identify a GE, does this count as 4 failures: one for the classification, one for the notification of the GE, one for the notification of the PARs and one for the PARs?

Response

It will only count as one failure: failure to classify the GE. This is because notification of the GE, development and notification of the PARs are actions that have to be performed as a consequence of the GE classification and that it can't be inferred a posteriori that these actions would have failed.

3

ID Question

35 Evaluation

Does success in classification, notification and PARs depend on the individual or team response - could an individual failure to properly classify, notify or develop PARs be corrected by the team and still be counted as a success for this indicator?

Response

The measures for successful opportunities under this indicator are accuracy and timeliness. As long as the classification, notification or PARs are timely and accurate, success is established. If the initial error of the individual is identified and corrected so that the timeliness criterion is met, the opportunity is successful.

4

ID Question

36 Opportunities

Is there not the possibility that PARs could be issued at the SAE level?

Response

If PARs at the SAE are in the site Emergency Plan they could be counted as opportunities. However, this would only be appropriate where assessment and decision making is involved in development of the PAR. Automatic PARs with little or no assessment required would not be an appropriate contributor to the PI. PARs limited to livestock or crops and no PAR necessary decisions are also not appropriate.

ID **Question**

37 Evaluation

During drill performance, the ERO may not always classify an event exactly the way that the scenario specifies. This could be due to conservative decision making, Emergency Director judgment call, or a simulator driven scenario that has the potential for multiple 'forks'. How does the program deal with these correct classification determinations that may not follow the path the evaluators were expecting?

Response

The NRC realizes that such situations can arise and that the acceptability of the classification may be subjective. In such cases, evaluators should document the rationale supporting their decision for eventual NRC inspection. However, as specified in NEI 99-02, in evaluating the acceptability of the classification, the evaluators have to determine if the classification was appropriate to the event as specified by the approved emergency plan and implementing procedures.

ID **Question**

38 Weighting

Why are the opportunities for NOUEs and Alerts being treated numerically the same as the ones associated with the more risk significant SAEs and GEs?

Response

Although the working group initially considered using weighting factors to emphasize opportunities associated with SAEs and GEs, industry (NEI) guidance suggested that this would unnecessarily complicate the indicator calculation and not be consistent with calculation of the other PIs. PI experts within NRC concurred with this assessment.

ID **Question**

39 Revision

If the utility holds the ERO to the standard of identifying multiple EALs for the same classification, could multiple opportunities for classification of a particular emergency classification be allowed?

Response

This idea has merit and if a proposal were received the Staff would consider it. However, several aspects should be considered in such a proposal including consistent implementation (all opportunities are assessed); consistent evaluation; how does the ERO member document/verbalize the additional EAL; what time frame is acceptable; and will the effort detract from other expected actions.

ID **Question**

40 Reporting

What if PI data is not readily available at the end of a quarterly reporting cycle, e.g., a six week operator training cycle begins before the end of quarter, but is not completed until after the quarterly reporting date.

Response

The data may be reported in the next quarter, but this practice must be implemented consistently. Inspection will verify that the data is not preferentially reported to manipulate PIs.

ID Question

41 Evaluation

How should performance be evaluated when drill participants properly declare an emergency classification that the scenario did not anticipate?

Response

The opportunity may be counted as a success, However, a corrective action should be written against the scenario (or the scenario development process). Another aspect of the same issue is that if a classification is missed that was not anticipated by the scenario, it too should be counted, but as a missed opportunity.

ID Question

43 May credit for ERO be taken from drills that do not contribute to DEP?

Response

If the position performs one of the risk significant EP functions, classification, notification or PAR development, then the drill/exercise used for ERO statistics must contribute to DEP statistics. However, some positions are not responsible for these risk significant functions and participation in a drill that does not contribute statistics to DEP could be credited as participation. For example the OSC Operations Management position could drill without contribution to DEP, as could Health Physics positions not responsible for PARs. The appropriateness including drills involving HP positions responsible for PARs is site specific. Many sites develop PARs through a management review process of the dose projections provided by HP. That being the case, drills involving just the dose projection may not be appropriate for DEP statistics, but may be appropriate for ERO Drill participation statistics.

ID Question

125 For the purpose of establishing success criteria for the EP DEP PI, how many 15-minute periods could there be for the example situation of a plant initially reaching a General Emergency?

Response

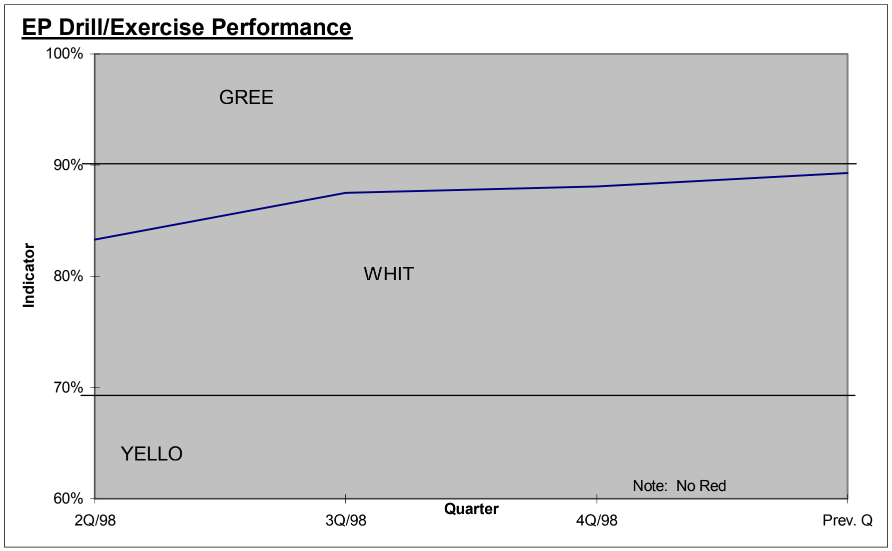
The licensee should classify an emergency once the data is available. The licensee should take a prudent approach and not delay classification due to uncertainty. Once the data is available the licensee should classify the event (NUE, Alert, Site Area, or General Emergency) and PAR within 15 minutes. Expectations are that you assess and classify the situation within 15 minutes. If you were done in 5 you should not wait the remaining 10 minutes. The call to the offsite emergency response organizations should be initiated during the next 15-minute time frame. Any changes to classification or PARs should reflect the same 15 minute sequence.

Hence there are two 15 minute time frame goals:
(1) to determine the classification and PAR, and
(2) to initiate notifications to the offsite emergency response agency.

Data Example

Emergency Response Organization
Drill/Exercise Performance

	3Q/96	4Q/96	1Q/97	2Q/97	3Q/97	4Q/97	1Q/98	2Q/98	3Q/98	4Q/98
Successful Classifications, Notifications & PARs over qtr	0	0	11	11	0	8	10	0	23	11
Opportunities to Perform Classifications, Notifications, & PARs in qtr	0	0	12	12	0	12	12	0	24	12
Total # of succesful Classifications, Notifications, & PARs in 8 qtrs								**40**	**63**	**74**
Total # of opportunities to perform Classification, Notifications & PARs in 8 qtrs								**48**	**72**	**84**
								2Q/98	**3Q/98**	**4Q/98**
Indicator expressed as a percentage of Opportunities to perform,								83.3%	87.5%	88.1%
Classifications, Communications & PARs										



EMERGENCY RESPONSE ORGANIZATION DRILL PARTICIPATION

Purpose

This indicator measures the percentage of key ERO members who have participated recently in proficiency-enhancing drills, exercises, training opportunities, or in an actual event.

Indicator Definition

The percentage of key ERO members that have participated in a drill, exercise, or actual event during the previous eight quarters, **as measured on the last calendar day of the quarter.**

Data Reporting Elements

The following data are required to calculate this indicator and are reported:

- total number of key ERO members
- total key ERO members that have participated in a drill, exercise, or actual event in the previous eight quarters

The indicator is calculated and reported quarterly, based on participation over the previous eight quarters

Calculation

The site indicator is calculated as follows:

$$\frac{\text{\# of Key ERO Members that have participated in a drill, exercise or actual event during the previous 8 qrts}}{\text{Total number of Key ERO Members}} \times 100$$

Definition of Terms

Key ERO members are those who fulfill the following functions:

- Control Room
    - Shift Manager (Emergency Director) - Supervision of reactor operations, responsible for classification, notification, and determination of protective action recommendations
    - Shift Communicator - provides initial offsite (state/local) notification
- Technical Support Center
    - Senior Manager - Management of plant operations/corporate resources
    - Key Operations Support

    - Key Radiological Controls - Radiological effluent and environs monitoring, assessment, and dose projections
    - Key TSC Communicator- provides offsite (state/local) notification
    - Key Technical Support

- Emergency Operations Facility

    - Senior Manager - Management of corporate resources
    - Key Protective Measures - Radiological effluent and environs monitoring, assessment, and dose projections
    - Key EOF Communicator- provides offsite (state/local) notification

- Operational Support Center

    - Key OSC Operations Manager

Clarifying Notes

Evaluated simulator training evolutions that contribute to the Drill/Exercise Performance indicator statistics could be considered as opportunities for key ERO member participation and may be used for this indicator. The scenarios must at least contain a formally assessed classification and the results must be included in DEP statistics. However, there is no intent to disrupt ongoing operator qualification programs. Appropriate operator training evolutions should be included in this indicator only when emergency preparedness aspects are consistent with training goals.

If a key ERO member or operating crew member has participated in more than one drill during the eight quarter evaluation period, the most recent participation should be used in the Indicator statistics.

If a change occurs in the number of key ERO members, this change should be reflected in both the numerator and denominator of the indicator calculation.

Participation may be as a participant, mentor, coach, evaluator, or controller, but not as an observer. Multiple assignees to a given key ERO position could take credit for the same drill if their participation is a meaningful opportunity to gain proficiency in the assigned position.

The meaning of "drills" in this usage, is intended to include proficiency enhancing evolutions (exercises, functional drills, simulator drills, table top drills, mini drills, etc.) that reasonably simulate the interactions between appropriate centers and/or individuals that would be expected to occur during emergencies. For example, control room interaction with offsite agencies could be simulated by instructors or OSC interaction could be simulated by a control cell simulating the TSC functions, and damage control teams.

When the functions of key ERO members include classification, notification or PAR opportunities, the success rate of these opportunities must contribute to Drill/Exercise Performance (DEP) statistics for participation of those key ERO members to contribute to ERO

Drill Participation. However, the licensee may designate drills as not contributing to DEP and, if the drill provides proficiency enhancing evolutions as described above, those key ERO members whose functions do not involve classification, notification or PARs may be given credit for ERO Drill Participation. Additionally, the licensee may designate elements of the drills not contributing to DEP (e.g., classifications will not contribute but notifications will contribute to DEP.) In this case, the participation of all key ERO members, except those associated with the non-contributing elements, may contribute to ERO Drill Participation. The licensee must document such designations in advance of drill performance and make these records available for NRC inspection.

The communicator (e.g., shift communicator, key TSC communicator) should be the person who fills out the initial notification form and is responsible for the notifications. The communicator is not expected to be just a phone talker who is not responsible for accuracy or timeliness (although some programs may wish to track such phone talkers). There is no intent to track a large number of shift communicators or personnel who are just phone talkers.

Frequently Asked Questions

ID Question

44 Duty Roster

How does the program address a person who is qualified in more than one position and listed on the ERO roster for all positions that he or she is qualified to fill?

Response

The licensee has to evaluate if the different positions being filled by the individual require different knowledge and skills to perform. If they do then it is expected that the person be counted in the denominator for each position and in the numerator only for drill/exercise participation that addresses each position. Where the skill set is similar, a single drill or exercise might be counted as participation in both positions. Examples of similar skill sets may include: Emergency Managers and their assistants or technical support staff; Communicators in different facilities; Health Physics personnel in different facilities. However, important differences in duties must be considered, e.g., TSC HP positions may involve onsite radiation safety where as EOF HP positions would not, and the EOF HP positions may involve dose projection duties where as the TSC HP positions may not. Another option would be to evaluate the need to maintain this person qualified to fill multiple positions if the depth of positions being filled is more than four, then dual qualification of the individual may not be necessary, depending on the design of the duty roster and call out system.

ID Question

45 Duty Roster

How does the program handle the case where someone shifts ERO position during the drill or exercise?

Response

The person's participation may be counted for each position as long as the participation constitutes a proficiency-enhancing experience. The licensee will make this determination. The NRC will verify the adequacy of the licensee's determination as part of its performance indicator verification inspection.

ID Question

46 Duty Roster

How does the program handle the case where the number of key ERO members is different at the end of the evaluation period than at the beginning of it?

Response

This indicator is calculated based on the number of key ERO members at the end of the quarter.

ID Question

47 Duty Roster

Could a licensee have key ERO members cycle through a position for an exercise or drill and allow them to be counted for this indicator?

Response

The licensee can have key ERO members cycle through a position for an exercise or drill and allow them to be counted for this indicator as long as the licensee can justify that their participation is a proficiency-enhancing experience.

ID Question

48 Drill Frequency

Is participating in a performance-training environment once every two years the new minimum expectation?

Response

There is no NRC requirement associated with the frequency of ERO personnel participation in drills or exercises. However, the threshold for this PI is that 80% of the key ERO members participate on a 2 year frequency for a plant to be considered as operating in the licensee response band (green).

ID Question

49 Duty Roster

Is there a minimum number of ERO members.

Response

The NRC's requirements for minimum staffing at nuclear power plants are given in NUREG 0654 Table B-1. The site Emergency Plan commits to a method to meet these requirements and that is the minimum ERO. The PI measures the participation of a segment of the ERO (key ERO members as defined in NEI 9902) in drills/exercises (or other appropriate proficiency enhancing experiences).

ID Question

50 Duty Roster

When a key ERO member is added to the organization or changes from one key ERO position to a different key ERO position between drills, is there a grace period for having him or her participate in drills?

Response

No, there is no grace period. However, if the individual's new position is similar to the old one, the last drill/exercise participation may count. If the new position is unrelated to the old position then the previous participation would not count.

1

ID Question

51 Evaluation

What would happen if an ERO member fails to correctly perform its duties, for example invoked a wrong classification - does this count as participation?

Response

Yes, the participation would count and the missed opportunity for proper classification would be reflected in the DEP indicator. It might be expected that the individual will receive feed back on performance to ensure proficiency, but as long as the DEP PI is in the licensee response band, this problem is left to the licensee to correct.

2

ID Question

52 Duty Roster

If a person is not yet qualified to fill a certain key ERO position but participated in a drill in that position for qualification purposes, would that participation count?

Response

This could be left to the licensee's judgment and verified by inspection. Where the participation in the drill/exercise is a proficiency-enhancing experience it could be counted. This would mean that the individual is familiar with the position and able to perform it but perhaps the lack of qualification is merely due to the timing of required classroom training. However, he should not formally be on the duty roster until fully qualified. When that occurs, the drill/exercise participation date could be used in reporting ERO.

3

ID Question

53 Duty Roster Can a single person fill multiple key functions?

Response

Yes, if that is in accordance with the approved emergency plan.

4

ID Question

54 Operators

Many plants have staff personnel who hold SRO licenses. These individuals only stand watch in the control room as necessary to retain an active license. Is it necessary to track these individuals under the ERO PI?

Response

Yes, because they could perform as the Shift Manager in an actual event. However, an informal survey of EP programs indicated that these personnel routinely participate in drills, either as key ERO members, or as evaluators. This being the case, the burden for licensees should be minimal.

5

ID Question

85 Shift Manager

In NEI 99-02, under Definition of Terms (Pg. 81), Control Room Shift Manager (Emergency Director) is identified as a key ERO member. We currently only include those Shift Managers who have been permanently assigned to an operating crew. Operations Department personnel who may be qualified as Shift Manager and may fill this role in relief (vacations, training, etc.) or periodically to maintain qualifications are not currently considered under this indicator. Should all individuals qualified to fill the Shift Manager position be considered under this indicator, regardless of whether they are assigned to a specific crew on a continuing basis?

Response

Yes. All individuals qualified to fill the Shift Manager position who actually might fill the position should be included in this indicator.

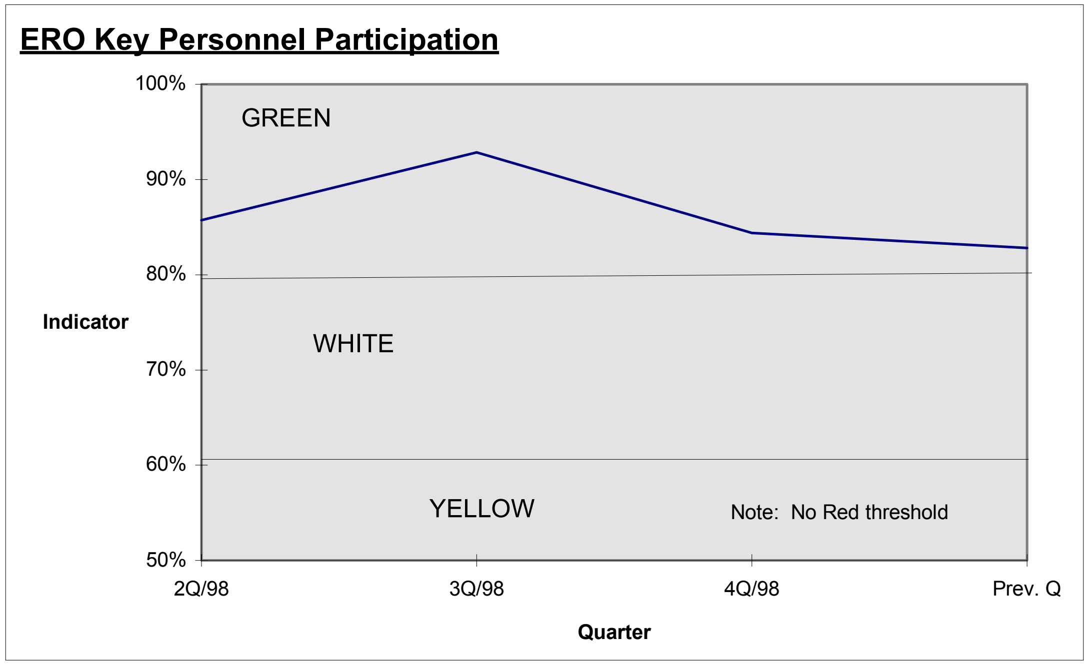
ID	Question
126	**Is it appropriate to track the Shift Supervisor's drill participation to meet the "shift communicator function" described in NEI 99-02?** **Response** **Yes, if the Shift Supervisor fills the Shift Communicator function.**

Data Example

Emergency Response Organization (ERO) Participation

	2Q/98	3Q/98	4Q/98	Prev. Q
Total number of Key ERO personnel	56	56	64	64
Number of Key personnel participating in drill/event in 8 qtrs	48	52	54	53
	2Q/98	**3Q/98**	**4Q/98**	**Prev. Q**
Indicator percentage of Key ERO personnel participating in a drill in 8 qtrs	86%	93%	84%	83%

Thresholds		
Green		≥80%
White		<80%
Yellow		<60%
No Red Threshold		



ALERT AND NOTIFICATION SYSTEM RELIABILITY

Purpose

This indicator monitors the reliability of the offsite Alert and Notification System (ANS), a critical link for alerting and notifying the public of the need to take protective actions. It provides the percentage of the sirens that are capable of performing their safety function.

Indicator Definition

The percentage of ANS sirens that are capable of performing their function, as measured by periodic siren testing in the previous 12 months.

Periodic tests are the regularly scheduled tests that are conducted to actually test the ability of the sirens to perform their function (e.g., silent, growl, siren sound test).

Data Reporting Elements

The following data are reported:

- the total number of ANS siren-tests during the previous quarter
- the number of successful ANS siren-tests during the previous quarter

Calculation

The site value for this indicator is calculated as follows:

$$\frac{\#\text{ of succesful siren - tests in the previous 4 qtrs}}{\text{total number of siren - tests in the previous 4 qtrs}} \times 100$$

Definition of Terms

Siren-Tests: the number of sirens times the number of times they are tested. For example, if 100 sirens are tested 3 times in the quarter, there are 300 siren-tests.

Successful siren-tests are the sum of sirens that performed their function when tested. For example, if 100 sirens are tested three times in the quarter and the results of the three tests are: first test, 90 performed their function; second test, 100 performed their function; third test, 80 performed their function. There were 270 successful siren-tests.

Clarifying Notes

The purpose of the ANS PI is to provide a uniform industry reporting availability approach and is not intended to replace the FEMA Alert and Notification reporting requirement at this time.

For those sites that do not have sirens, the performance of the licensee’s alert and notification system will be evaluated through the NRC baseline inspection program. A site that does not have sirens does not report data for this indicator.

If a siren is out of service for maintenance or is inoperable at the time a regularly scheduled test is conducted, then it counts as both a siren test and a siren failure.

Frequently Asked Questions

ID Question

55 Equipment

This indicator only monitors siren reliability. Why aren't other EP equipment and facilities monitored?

Response

Ensuring public health and safety is the goal of the NRC oversight program. Analysis of the EP function shows that the ANS is a risk-significant system in ensuring licensee ability to protect the public health and safety. There is other important equipment and facilities, but ensuring the readiness of these is in the licensee response band. ERO measures the participation of key emergency response organization members in drills/exercises and assumes, in part, that such participation is a good method to identify equipment and facility problems. DEP measures timely and accurate classifications, notifications and PARs, which can only be performed if communication and assessment equipment are functioning. It is expected that licensee corrective action programs will address equipment readiness problems that are identified during drills. These programs are a focus of the NRC inspection program.

ID Question

56 Sirens

If some sirens were unavailable due to storm damage, would the missed siren-tests prior to the sirens being returned to service be considered failures?

Response

Yes, the missed siren-tests would be considered failures. However, if the licensee can repair the damaged sirens prior to the test, then the siren tests would be considered successful.

ID Question

122 In defining the "total number of siren-tests in the previous 4 quarters" should those sirens not tested because they were either out of service or undergoing maintenance at the time of the test be included in the denominator of total number of siren-tests? Should this number simply be the total number of sirens times the number of tests or the actual number of sirens tested? In our case, all sirens are always tested (except those that cannot be physically tested due to outage or maintenance) as part of each test.

Response

The total number of sirens should be reported in the denominator.

ID	Question
123	Some of the sirens included in the alert and notification performance indicator have the capability to be sounded from a remote location using a siren encoder. A quarterly 'growl' test is conducted at each siren site. Encoder testing is performed separately. Does the malfunction of a remote siren encoder constitute a failure if the siren is functional by local actuation?

Response

Testing mechanisms used to comply with FEMA reporting methodology should be used to report performance indicator statistics. Failures occurring during this testing would count toward the performance indicator.

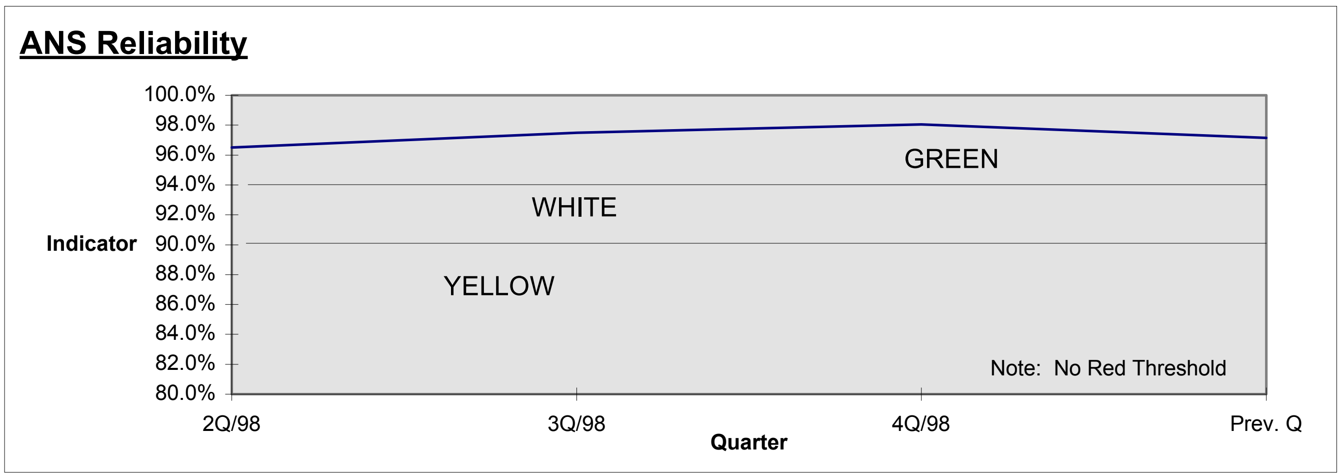
ID	Question
124	The EP cornerstone, PI Alert and Notification System Reliability reports tests performed of off-site sirens to determine the systems reliability. Indian Point 3 is on the same site as Indian Point 2 but owned and operated by the New York Power Authority. IP3 uses the offsite sirens to meet its EP requirements. However, the sirens are owned, operated, and tested by Con Edison, owners of Indian Point 2. IP3 has an administrative agreement on use of the sirens by IP2 for IP3. Con Edison (IP2) notifies NYPA (IP3) by letter on the results of their siren testing and the status of their equipment. Question; does Indian Point 3 have to report data for this PI (EP03) since NYPA does not perform the testing nor control the sirens, and only reports what Indian Point 2 reports ? (i.e., duplicate what IP2 reports)

Response

Yes. The responsibility to notify the public is held mutually by each licensee located on the same site with the same EPZ. Therefore, each licensee should provide alert and notification performance data event if it is repetitive due to a mutually shared site.

Data Example

Alert & Notification System Reliability							
Quarter	**3Q/97**	**4Q/97**	**1Q/98**	**2Q/98**	**3Q/98**	**4Q/98**	**Prev. Q**
Number of succesful siren-tests in the qtr	47	48	49	49	49	54	52
Total number of sirens tested in the qtr	50	50	50	50	50	55	55
Number of successful siren-tests over 4 qtrs				193	195	201	204
Total number of sirens tested over 4 qtrs				200	200	205	210
				2Q/98	**3Q/98**	**4Q/98**	**Prev. Q**
Indicator expressed as a percentage of sirens				96.5%	97.5%	98.0%	97.1%
Thresholds							
Green	≥94%						
White	<94%						
Yellow	<90%						
Red							



2.5 OCCUPATIONAL RADIATION SAFETY CORNERSTONE

The objectives of this cornerstone are to:

(1) keep occupational dose to individual workers below the limits specified in 10 CFR Part 20 Subpart C; and

(2) use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses that are as low as is reasonably achievable (ALARA) as specified in 10 CFR 20.1101(b).

There is one indicator for this cornerstone:

- Occupational Exposure Control Effectiveness

OCCUPATIONAL EXPOSURE CONTROL EFFECTIVENESS

Purpose

The purpose of this performance indicator is to address the first objective of the occupational radiation safety cornerstone. The indicator monitors the control of access to and work activities within radiologically-significant areas of the plant and occurrences involving degradation or failure of radiation safety barriers that result in readily-identifiable unintended dose.

The indicator includes dose-rate and dose criteria that are risk-informed, in that the indicator encompasses events that might represent a substantial potential for exposure in excess of regulatory limits. The performance indicator also is considered "leading" because the indicator:

- encompasses less-significant occurrences that represent precursors to events that might represent a substantial potential for exposure in excess of regulatory limits, based on industry experience; and

- employs dose criteria that are set at small fractions of applicable dose limits (e.g., the criteria are generally at or below the levels at which dose monitoring is required in regulation).

Indicator Definition

The performance indicator for this cornerstone is the sum of the following:

- Technical specification high radiation area (>1 rem per hour) occurrences
- Very high radiation area occurrences
- Unintended exposure occurrences

Data Reporting Elements

The following data are reported for each site:

- The number of technical specification high radiation area (>1 rem per hour) occurrences during the previous quarter
- The number of very high radiation area occurrences during the previous quarter
- The number of unintended exposure occurrences during the previous quarter

Calculation

The indicator is determined by summing the reported number of occurrences for each of the three data elements during the previous **4** quarters.

Definition of Terms

Technical Specification High Radiation Area (>1 rem per hour) Occurrence - A nonconformance (or concurrent nonconformances) with technical specifications (or comparable provisions in licensee procedures if the technical specifications do not include provisions for high radiation areas) and comparable requirements in 10 CFR 20 applicable to technical specification high radiation areas (>1 rem per hour) that results in the loss of radiological control over access or work activities within the respective high-radiation area (>1 rem per hour). Technical Specification high radiation areas, commonly referred to as locked high radiation areas, includes any area, accessible to individuals, in which radiation levels from radiation sources external to the body are in excess of 1 rem (10 mSv) per 1 hour at 30 centimeters from the radiation source or 30 centimeters from any surface that the radiation penetrates, and excludes very high radiation areas. Technical specification high radiation areas, in which radiation levels from radiation sources external to the body are less than or equal to 1 rem (10 mSv) per 1 hour at 30 centimeters from the radiation source or 30 centimeters from any surface that the radiation penetrates, are excluded from this performance indicator.

- “Radiological control over access to technical specification high radiation areas” refers to measures that provide assurance that inadvertent entry into the technical specification high radiation areas by unauthorized personnel will be prevented.

- “Radiological control over work activities” refers to measures that provide assurance that dose to workers performing tasks in the area is monitored and controlled.

Examples of occurrences that would be counted against this indicator include a failure to secure an area against unauthorized access, a failure to provide a means of personnel dose monitoring or control required by technical specifications, or an actual unauthorized or unmonitored entry into an area.

Very High Radiation Area Occurrence - A nonconformance (or concurrent nonconformances) with 10 CFR 20 and licensee procedural requirements that results in the loss of radiological control over access to or work activities within a very high radiation area. “Very high radiation area” is defined as any area accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving an absorbed dose in excess of 500 rads (5 grays) in 1 hour at 1 meter from a radiation source or 1 meter from any surface that the radiation penetrates

- "Radiological control over access to very high radiation areas" refers to measures to ensure that an individual is not able to gain unauthorized or inadvertent access to very high radiation areas.

- "Radiological control over work activities" refers to measures that provide assurance that dose to workers performing tasks in the area is monitored and controlled.

Unintended Exposure Occurrence - A single occurrence of the degradation or failure of one or more radiation safety barriers resulting in unintended occupational exposure(s) equal to or exceeding any of the following dose criteria from a single occurrence:

- 2% of the stochastic limit in 10 CFR 20.1201 on total effective dose equivalent. The 2% value is 0.1 rem.

- 10 % of the non-stochastic limits in 10 CFR 20.1201. The 10% values are as follows:

5 rem	the sum of the deep-dose equivalent and the committed dose equivalent to any individual organ or tissue
1.5 rem	the lens dose equivalent to the lens of the eye
5 rem	the shallow-dose equivalent to the skin or any extremity, other than dose received from a discrete radioactive particle

- 20% of the limits in 10 CFR 20.1207 and 20.1208 on dose to minors and declared pregnant women. The 20% value is 0.1 rem.

- 100% of the limit on shallow-dose equivalent from a discrete radioactive particle. The current value is 50 rem.[4]

The dose criteria are established at levels deemed to be readily identifiable, based on industry experience. The dose criteria should not be taken to represent levels of dose that are "risk-significant." In fact, the criteria are generally at or below dose levels that are required by regulation to be monitored or to be routinely reported to the NRC as occupational dose records.

Examples of "degradation or failure of radiation barriers" that could potentially count against this indicator include the following (i.e., if the degradation or failure directly results in unintended dose equal to or greater than the respective criteria):

[4] The NRC is currently proceeding with rulemaking that may result in a change to the limit on shallow-dose equivalent from a discrete radioactive particle. At the time a final rule is issued, the performance indicator value will be revised as needed.

- failure to identify and post a radiological area
- failure to implement required physical controls over access to a radiological area
- failure to survey and identify radiological conditions
- failure to train or instruct workers on radiological conditions and radiological work controls
- failure to implement radiological work controls (e.g., as part of a radiation work permit)

"Unintended exposure" refers to exposure that is in excess of the administrative dose guidelines set by licensees as part of the radiological controls for access or entry into a radiological area. Administrative dose guidelines may be established within radiation work permits or other documents, via the use of alarm setpoints for personnel dose monitoring devices, or other means, as specified by the licensee. Such an administrative dose guideline set by the licensee is not a regulatory limit and does not, in itself, constitute a regulatory requirement.

Clarifying Notes

Occurrences that potentially meet the definition of more than one element of the performance indicator will only be counted once. In other words, an occurrence will not be double-counted (or triple-counted) against the performance indicator.

Frequently Asked Questions

ID Question

92 Some radiological areas are posted or controlled as "locked high radiation areas" for precautionary or administrative purposes, even though the dose rates are not actually in excess of 1 rem per hour. Does the Technical Specification High Radiation Area (>1 rem) element of the Occupational Exposure Control Effectiveness PI apply to such areas?

Response

No. The Technical Specification High Radiation Area (>1 rem) element of the PI applies to areas that are "accessible to individuals, in which radiation levels from radiation sources external to the body are in excess of 1 rem (10 mSv) per hour at 30 centimeters from the radiation source or 30 centimeters from any surface that the radiation penetrates."

ID Question

94 A key to the door of a high radiation area (>1 rem per hour) was issued to an individual. The individual used the key to provide access to the high radiation area by plant personnel. It was subsequently discovered that the individual was not qualified to be issued high radiation area keys. Does this count against the PI?

Response

Yes. The question is whether this situation constituted a nonconformance with the technical specifications for administrative control of high radiation area keys. For example, typical wording in technical specifications is that "the keys shall be maintained under the administrative control of the Shift Foreman on duty or health physics supervision.

ID Question

96 A door to a high radiation area (>1 rem per hour) was found unlocked and unguarded. In a similar occurrence, the gate to a high radiation area (>1 rem per hour) controlled with flashing lights was

found unlatched and unguarded. A follow-up investigation in both cases indicated that no unauthorized entry had been made into the area. Do these occurrences count against the PI?

Response

Yes. Such occurrences should be counted under the PI as nonconformance with technical specifications. Typical wording in technical specifications states that such areas “shall be provided with locked or continuously guarded doors to prevent unauthorized entry,” and that areas with flashing lights shall be “barricaded.” Whether anyone accessed the area is not material to meeting the technical specification requirement.

ID	Question
98	While individuals were working in an area, the local area radiation monitor alarmed. The workers promptly exited the area and notified health physics. Follow-up surveys by the health physics staff indicated that radiation dose rates in the area had increased to a level in excess of 1 rem per hour. Proper controls and posting were then established for the area. Does this count against the PI?
	Response
	No. As described, this occurrence would not appear to be “countable” against the PI. The purpose of the area radiation monitors is to alert personnel to increases in radiation levels. It appears that the personnel responded appropriately to the alarm by exiting the area and notifying health physics, and that proper follow-up actions were then taken with regard to implementing controls as required by the technical specifications. However, the circumstances that led to the increase in dose rates and the resultant dose to the individuals should be evaluated per the criteria for the Unintended Dose element of the PI.

ID	Question
100	During performance of routine radiation surveys a health physics technician determined that the radiation levels in an area were in excess of 1 rem per hour. Proper controls and posting were established for the area. The increase in radiation levels was due to a change in plant system configuration made earlier in the shift. Does this count against the PI?
	Response
	The answer to this question depends upon the specific circumstances, for example, whether the survey and actions taken were timely and appropriate, whether the potential for the change in radiological conditions was anticipated, etc. In general, identifying changes in radiological conditions is an expected outcome of performing systematic and routine radiation surveys. Thus, such occurrences would not typically be counted against the PI. However, if surveys are not performed or controls are not established in an appropriate and timely manner, then such occurrences may be “countable” against the PI.It is not practical to define specific criteria for “timely and appropriate” for generic application. Such occurrences should be evaluated taking into account the circumstances that led to the change in radiological conditions and the scope and purpose of the survey that identified the change in conditions.

ID	Question
102	A health physics technician exited a contaminated high radiation area (>1 rem per hour), secured the access door, removed his protective clothing, and left the high radiation area key at the stepoff pad. The technician went to a nearby frisker to check himself for contamination, and then returned to the stepoff pad to retrieve the key. Should this be counted against the PI with regard to administrative control of the key?
	Response
	No. This should not be counted under the PI. It does not represent a loss of administrative control over the key.

ID	Question
104	An individual accessed a high radiation area (>1 rem per hour) and was provided with a radiation survey instrument (i.e., a radiation monitoring device that continuously indicates the radiation dose rate in the area). Access was made under an approved radiation work permit (RWP) which specified a maximum allowable staytime that was complied with. Subsequent to the access, it was determined that the radiation survey instrument provided to the individual had not been source-checked “daily or prior to use” as specified in plant procedures. The radiation survey instrument was then tested and determined to be fully operable and within calibration. Should this be counted against the PI?
	Response
	No. If the applicable provisions of technical specifications (or licensee commitments for alternate control for high radiation areas if the technical specifications do not include provisions for high radiation areas) do not explicitly require the source check, then this should not be counted against the PI. Although this situation appears to represent a nonconformance with plant procedures, the performance basis for the PI appears to have been met in that the radiation survey instrument was, in fact, operable and in calibration.

ID	Question
106	Does the PI for technical specification high radiation areas (>1 rem per hour) and very high radiation areas apply to spent fuel pools?
	Response
	In general, spent fuel pools are not considered high radiation areas because of the inaccessibility of radioactive materials that are stored in the pool, provided that: “1) control measures are implemented to ensure that activated materials are not inadvertently raised above or brought near the surface of the pool water, 2) all drain line attachments, system interconnections, and valve lineups are properly reviewed to prevent accidental drainage of the water, and 3) controls for preventing accidental drops in water levels that may create high and very high radiation areas are incorporated into plant procedures” ((Regulatory Guide 8.38). However, when a diver enters the pool to perform underwater activities, or upon movement of highly radioactive materials stored in the pool, proper controls must be implemented. Health Physics Position No. 016 also provides guidance on the applicability of access controls for spent fuel pools.

ID	Question
108	Is the determination of the amount of dose received as the result of an unintended exposure occurrence based solely on the dose tracking method being used (e.g., EPD or stay-time tracking), or can other data be used? For example, upon exiting a radiological area, an individual's EPD indicates that the unintended exposure is 125 mrem. A subsequent evaluation of thermo-luminescent dosimeter data indicates that the unintended exposure is 75 mrem. Which result should be used in determining if the occurrence should be counted under the PI?
	Response
	The best-available data relevant to the PI should be used to determine whether any of the PI dose-screening criteria have been exceeded.As described in the example, the determination should include an evaluation of which data more accurately represents the dose received –which is the result that should be applied to the PI dose-screening criteria. For example, if there is reason to believe that the EPD data is invalid, e.g., due to over-response to the type of radiation involved, radio-frequency interference, or equipment malfunction, then other data including the TLD results may be used.However, the evaluation should not lose sight of the intent of the PI. The PI is intended to identify occurrences of "degradation or failure of one or more radiation safety barriers resulting in …" a "readily-identifiable" level of unintended exposure for the purpose of trending overall performance in the area of occupational radiation safety. The dose-screening criteria serve as a tool for determining what level of dose is "readily identifiable," based on industry experience, and do not represent levels of dose that are "risk-significant." In fact the criteria are at or below levels of occupational dose that are required by regulation to be monitored or routinely reported to the NRC as occupational dose records.Therefore, the evaluation of resultant dose from an occurrence should not overshadow the objective of trending and correcting program discrepancies as intended by the use of the performance indicators.

ID	Question
110	The administrative dose guideline for an individual working in a high radiation area was established via an EPD alarm setpoint at 100 mrem. When exiting the area, the individual noted that the EPD alarm was sounding and the indicated dose was 250 mrem. Due to excessive noise, the individual had not heard the alarm while in the high radiation area. Should this be counted under the PI.
	Response
	Yes. The impact of excessive noise on the effectiveness of the EPD alarm as a dose control measure was not properly evaluated, e.g., as part of the area survey or review of the work scope. This represents a "degradation or failure" of a radiation safety barrier.

ID	Question
112	Three individuals entered a radiological area to perform preventative maintenance work on a valve. Each of the workers was provided an EPD, worn on the chest, with an alarm setting of 100 mrem –which also served as the administrative dose guideline for the entry. The EPD setting, and the location of the EPD on the chest, was based on a survey that indicated that the highest source of exposure was the valve itself. Upon exiting the area the individual doses, as indicated by the EPD, ranged from 75-90 mrem. However, a follow-up survey of the area revealed that a pump, located behind where the individuals were working on the valve, represented a higher source of exposure than the valve. This was apparently missed during the pre-job survey of the work area. Therefore, the EPD, located on the chest, were not properly placed to monitor dose at the point of highest exposure. An evaluation of stay-times and orientation of the individuals in the work area determined that the actual exposures were three times what was indicated by the EPD. Does this count under the PI? If so, since three individuals were involved, would this be 1 or 3 counts under the PI?
	Response
	Yes. This should be counted under the PI. As described, there clearly was a degradation or failure of one or more radiation safety barriers. From the example, the unintended exposure for the three individuals ranged from 125 to 170 mrem, which each exceeded the 100 mrem dose-screening criterion. Although three individuals were involved, there was only one “occurrence” involving degradation or failure of one or more radiation safety barriers. Therefore, this would only be counted once under the PI.

ID	Question
91	We are currently reviewing our corrective action program documents to identify radiological occurrences that should be counted under the PI for Occupational Exposure Control Effectiveness. In conducting this review, we are trying to evaluate some occurrences that were not analyzed (at the time of occurrence) using the PI criteria, i.e., we are applying the PI criteria retrospectively. What “new” criteria are established in the PI for Occupational Exposure Control Effectiveness? How should such criteria be applied retrospectively?
	Response
	Response is in preparation or review.

ID	Question
93	During a routine check of high radiation area doors and gates, a door popped open when tested. Follow-up investigation determined that the latching mechanism had failed due to a mechanical defect. A similar issue regards the discovery of loose mounting bolts on a high radiation area gate. The looseness of the mounting bolts could have allowed enough movement for someone to force the gate open. No one had actually made an unauthorized entry into the high radiation area in either case. Are such situations counted against the PI?
	Response
	No. This type of situation would not be counted against the PI if it was identified and corrected in a timely manner, appeared to be an isolated occurrence, and had not led to an unauthorized entry into a high radiation area (>1 rem per hour). In essence, these situations represent the discovery of a deficient condition and do not reflect a nonconformance with applicable technical specifications or 10 CFR Part 20 requirements.

1

ID Question

95 During a routine check, the keybox (containing high radiation area keys) in the health physics office was found unlocked, which is contrary to plant procedures. A follow-up investigation determined that all keys were accounted for and no keys had been issued or used in an unauthorized manner. Does this count against the PI.

Response

No. Although this situation apparently represents a nonconformance with plant procedures, it does not appear to be a situation that would be counted against the PI. The question is whether the keys were administratively controlled per the technical specifications. From the description of the circumstances, administrative control over the keys was maintained.

2

ID Question

97 An individual entered a high radiation area (>1 rem per hour) with an electronic personnel dosimeter (EPD) that was not turned on. Does this count against the PI?

Response

Yes. The technical specifications typically provide several options for monitoring of individuals accessing high radiation areas, including the option of being provided "a radiation monitoring device that continuously integrates the radiation dose in the area and alarms when a preset integrated dose is received" (e.g., a functioning EPD). If that was the applicable option in this situation, and none of the other options were in effect, then the occurrence should be counted under the PI.

3

ID Question

99 A wire cage had been constructed around an area of the plant containing a resin transfer line that, during resin transfer operations, is subject to transient radiation levels in excess of 1 rem per hour. The wire cage was constructed in a manner to preclude personnel access to areas where the dose rates exceed 1 rem per hour, sometimes referred to as a "cocoon." The caged area is located within a room that is posted and controlled as a high radiation area. Does the PI for technical specification high radiation areas (>1 rem per hour) apply to this situation.

Response

No. Health Physics Position No. 242 provides guidance that 10 CFR Part 20 requirements for high radiation areas do not apply to such areas that are not accessible, e.g., "cocooned" areas. So long as the dose rates 30 cm beyond the caged area do not exceed 1 rem per hour, the PI does not apply.

4

ID Question

101 An individual enters an area (not posted and controlled as a high radiation area) and his EPD alarms on high dose rate. The individual promptly exits the area and notifies health physics. . Follow-up surveys by the health physics staff indicated that radiation dose rates in the area were in excess of 1 rem per hour. Proper controls and posting were established for the area. Does this count against the PI?

Response

Yes. As described, this occurrence should be counted against the PI. It appears that the high radiation area (>1 rem per hour) existed prior to access being made to the area, and that proper posting and controls were not in place to prevent unauthorized entry, as required by technical specifications.

ID **Question**

103 An independent verification was not made to ensure that the door of a high radiation area (>1 rem per hour) was secured after exiting the area. The independent verification is required by plant procedures as a defense-in-depth measure. It is not explicitly required by technical specifications. A follow-up investigation determined that the door was, in fact, secured. Should this be counted against the PI?

Response

No. This type of occurrence should not be counted against the PI. The reference criteria for the PI for technical specification high radiation areas (>1 rem per hour) are the technical specifications (or licensee commitments for alternate controls for high radiation areas if the technical specifications do not include provisions for high radiation areas) and applicable provisions of 10 CFR Part 20. Licensees may opt to implement additional controls, i.e., beyond what is required by technical specifications and 10 CFR Part 20, but such controls are outside the scope of the PI.

ID **Question**

105 Plant procedures include a provision that approval of both the operations shift supervisor and the health physics supervisor is required for issuance of keys to very high radiation areas. This provision is in addition to that for issuance of high radiation area keys, which only requires the approval of the health physics supervisor. If a very high radiation area key is issued without the approval of the operations shift supervisor, i.e., contrary to the plant procedure, does this count against the PI.

Response

Yes. This should be counted against the PI. The criteria for very high radiation area occurrences are based on "nonconformance with 10 CFR Part 20 and licensee procedural requirements that result in the loss of radiological control over access to or work within a very high radiation area." Part 20.1602 requires that licensees "shall institute additional measures to ensure that an individual is not able to gain unauthorized or inadvertent access" to very high radiation areas. Such additional measures are typically implemented through plant procedures or engineered controls because there is no technical specification specifically for very high radiation areas. Therefore, occurrences that involve a failure to implement such additional measures should be counted against the PI. Regulatory Guide 8.38 describes several additional measures that are acceptable to the staff.

ID **Question**

107 With regard to unintended exposure from external sources, is the EPD alarm setpoint the required reference point that should be used for determining if the 100 mrem TEDE criterion has been exceeded?

Response

No. The EPD alarm setpoint is not the only reference point (i.e., administrative dose guideline) that can be used for the unintended exposure PI. The PI Manual provides guidance that "administrative dose guidelines may be established within radiation work permits or other documents, via the use of alarm setpoints for personnel monitoring devices, or other means, as specified by the licensee." However, it is up to the licensee to specify what method or methods are being applied with regard to the unintended exposure PI.

ID	Question
109	Upon exiting from working in the fuel transfer canal, an individual monitored himself with a frisker and detected facial contamination. Follow-up investigation determined that the individual received an intake that resulted in a committed effective dose equivalent (CEDE) of 110 mrem. The pre-job evaluation did not anticipate a potential for an intake and no administrative guideline for internal dose was specified for the work. Should this be counted under the PI for unintended exposure?

Response

Yes. This should be counted against the PI. Since internal dose apparently was not anticipated as part of the job planning and controls, then the 110 mrem CEDE should be applied under the PI, which exceeds the 100 mrem TEDE criterion. For similar situations involving shallow dose equivalent, lens dose equivalent, and committed dose equivalent, where such dose has not been anticipated as part of the job planning and controls, the dose received should be applied to the respective criteria.

ID	Question
111	A team of workers, including a health physics technician, made a containment entry at power to investigate possible primary system leakage. Each team member was provided an EPD set to alarm at 200 mrem, which was the administrative dose guideline established for the entry. The walkdown in containment took longer than expected, and eventually several of the EPDs began to alarm, having reached the alarm setpoint of 200 mrem. After discussion with the rest of the team, the health physics technician (as permitted by plant procedures) authorized an extension of the administrative dose guideline to 300 mrem to complete the walkdown. This action was taken to minimize the overall dose that would be incurred if the team were to exit the containment, regroup, and then make a second entry to complete the walkdown. When the team completed the walkdown and exited the containment, two of the team had received a dose of 325 mrem. Does this occurrence count against the PI?

Response

No. This occurrence should not be counted against the PI because the resulting dose was only 25 mrem greater than the revised guideline of 300 mrem. The use and specification of administrative dose guidelines is the responsibility of the licensee. As described in the example, the revision to the administrative dose guideline was conducted in accordance with the plant procedures or program. Therefore, the revised guideline would be applicable to the PI.

ID	**Question**
130	**For high radiation areas (> 1 rem) where a flashing light is used as a TS required control, is it considered an occurrence under the Occupational Exposure high radiation area reporting element as a failure of administrative control if it is discovered that the flashing light has failed some time after the control was implemented? Failure of the light could be due to loss of its power source (dead battery or external power loss), mechanical failure (light bulb), etc.**

Response

No. The PI is intended to capture radiation safety program failures, not isolated equipment failures. This answer presumes that the occurrence was isolated and was corrected in a timely manner.

ID Question

131 **This question refers to radiography work performed at a plant under another licensee's 10 CFR Part 34 license. If there is an occurrence associated with the radiography work involving loss of control of a high or very high radiation area or unintended dose, does this count under the occupational radiation safety PI?**

Response

No. Radiography work conducted at a plant under another licensee's 10 CFR Part 34 license is outside the scope of the PI. Responsibility for barriers, dose control, etc., resides with the Part 34 licensee. The reactor regulatory oversight PIs apply to Part 50 licensee activities.

ID Question

132 **For multiple unit sites, if a PI-reportable condition occurs on one unit, e.g., a Technical Specification high radiation area occurrence inside the Unit 1 containment building, is it necessary to report the occurrence in the indicator for all units?**

Response

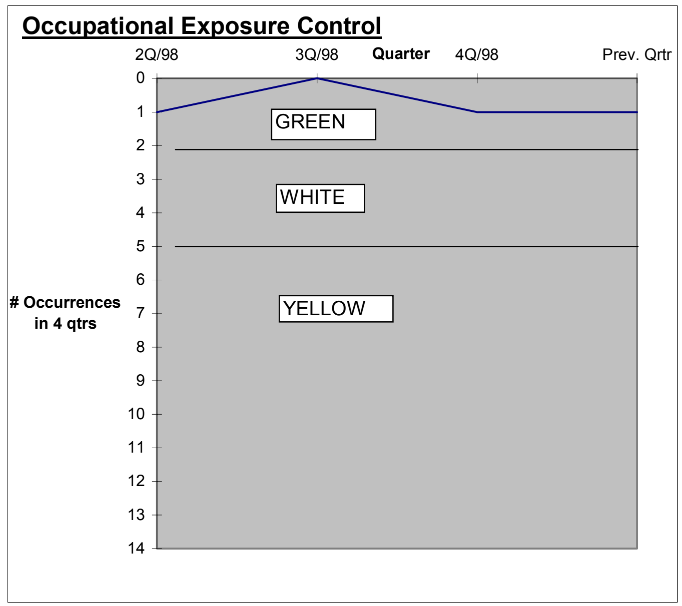
Yes. The PI is a site-wide indicator. The current reporting mechanism requires that occupational radiation safety occurrences be input identically for each unit. However, the occurrence is only counted once toward the site-wide threshold value (i.e., it is not double or triple counted for multiple unit sites).

Data Example

Occupational Exposure Control Effectiveness

Quarter	3Q/95	4Q/95	1Q/96	2Q/96	3Q/96	4Q/96	1Q/97	2Q/97	3Q/97	4Q/97	1Q/98	2Q/98	3Q/98	4Q/98	Prev. Qrtr
Number of technical specification high radiation occurrences during the quarter	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Number of very high radiation area occurrences during the quarter	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
Number of unintended exposure occurrences during the quarter	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Reporting Quarter				**2Q/96**	**3Q/96**	**4Q/96**	**1Q/97**	**2Q/97**	**3Q/97**	**4Q/97**	**1Q/98**	**2Q/98**	**3Q/98**	**4Q/98**	**Prev. Qrtr**
Total # of occurrences in the previous 4 qtrs				4	3	3	1	1	2	2	1	1	0	1	1

Thresholds	
Green	≤2
White	>2
Yellow	>5
No Red Threshold	



2.6 PUBLIC RADIATION SAFETY CORNERSTONE

RETS/ODCM RADIOLOGICAL EFFLUENT OCCURRENCE

Purpose

To assess the performance of the radiological effluent **control** program.

Indicator Definition

Radiological effluent release occurrences per **site** that exceed the values listed below:

Radiological effluent releases in excess of the following values:		
Liquid Effluents	Whole Body Organ	1.5 mrem/qtr 5 mrem/qtr
Gaseous Effluents	Gamma Dose Beta Dose Organ Doses from I-131, I-133, H-3 & Particulates	5 mrads/qtr 10 mrads/qtr 7.5 mrems/qtr

Note:

(1) Values are derived from the Radiological Effluent Technical Specifications (RETS) or similar reporting provisions in the Offsite Dose Calculation Manual (ODCM), if applicable RETS have been moved to the ODCM in accordance with Generic Letter 89-01.

(2) The dose values are applied on a per reactor unit basis in accordance with the RETS/ODCM.

(3) For multiple unit sites, allocation of dose on a per reactor unit basis from releases made via common discharge points is to be calculated in accordance with the methodology specified in the ODCM.

Data Reporting Elements

Number of RETS/ODCM Radiological Effluent Occurrences each quarter involving assessed dose in excess of the indicator effluent values.

Calculation

Number of RETS/ODCM Radiological Effluent Occurrences **per site** in the previous four quarters.

Definition of Terms

A RETS/ODCM Radiological Effluent Occurrence **is** defined as **a** release that exceed**s** any **or all** of the five identified values outlined in the above table. These are the whole body and organ dose values for liquid effluents and the gamma dose, beta dose, and organ dose values for gaseous effluents.

Clarifying Notes

The following conditions do not count against the RETS/ODCM Radiological Effluent Occurrence:

- Liquid or gaseous monitor operability issues
- Liquid or gaseous releases in excess **of** RETS/ODCM concentration or **instantaneous** dose-rate values
- Liquid or gaseous releases without treatment but that do not exceed values in the table

Frequently Asked Questions

ID Question

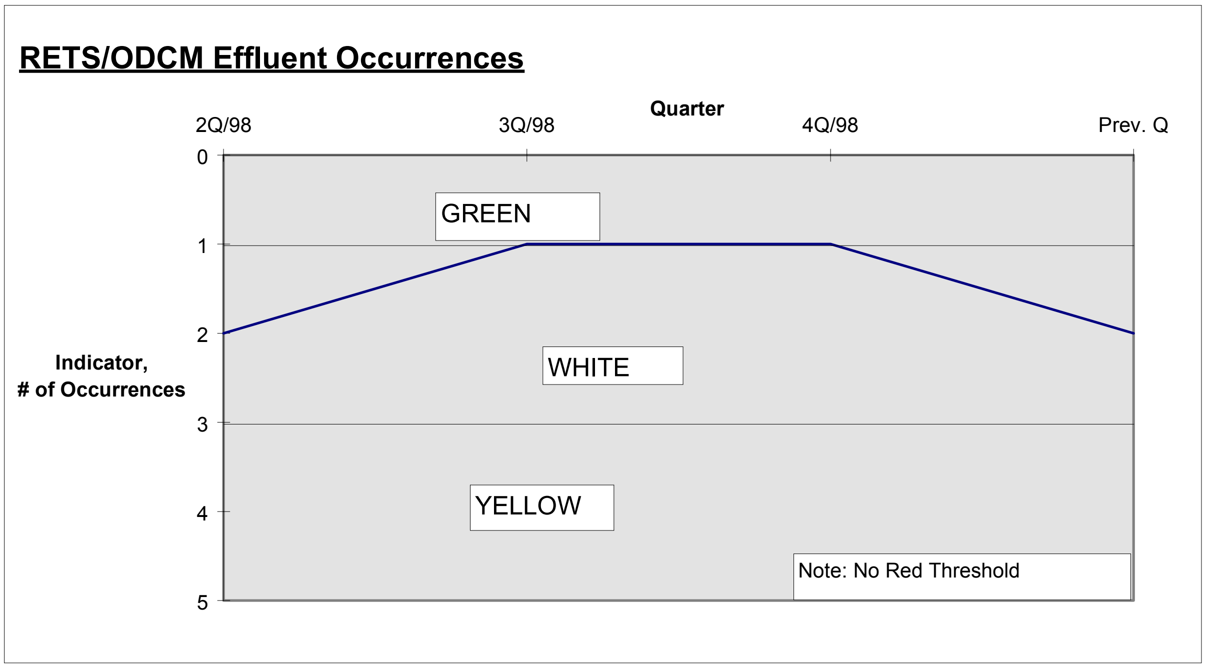
90 The PI for RETS/ODCM radiological effluent occurrences includes the number of occurrences each quarter involving assessed dose in excess of the indicator values. However, some data utilized in assessing dose for radiological effluents may not be available at the time of making quarterly PI reports. For example, the analytical results for composite samples are typically not finalized within the PI reporting period following the end of the quarter. How should this be handled with regard to making the quarterly PI reports?

Response

It is understood that not all effluent sample results are required to be finalized at the time of submitting the quarterly PI reports. Therefore, the reports should be based upon the best-available data. If subsequently available data indicates that the number of occurrences for this PI is different that that reported, then the report should be revised, along with an explanation regarding the basis for the revision. From a practical perspective, it is very unlikely that the data that is typically not available at the time of PI reporting would have the effect of causing a change in the reported number of occurrences. The circumstances associated with an occurrence as defined in this PI would be expected to include numerous indications, not limited to composite sample analysis, that there was an occurrence, for example elevated RCS activity, transient events, and effluent radiation monitor indications.

Data Example

RESTS/ODCM Radiological Effluent Indicator							
Quarter	3Q/97	4Q/97	1Q/98	2Q/98	3Q/98	4Q/98	Prev. Q
Number of RETS/ODCM occurrences in the qtr	1	0	0	1	0	0	1
				2Q/98	3Q/98	4Q/98	Prev. Q
Number of RETS/ODCM occurrences in the previous 4 qtrs				2	1	1	2



2.7 PHYSICAL PROTECTION CORNERSTONE

Performance indicators for this cornerstone were selected to provide baseline and trend information needed to evaluate each licensee's physical protection and access authorization systems. The regulatory purpose is to provide high assurance that these systems will function to protect against the design basis threat of radiological sabotage as defined in 10 CFR Part 73. As a surrogate to any engineered physical security protection system, posted security officers provide compensation when a portion of the system is unavailable to perform its intended function. The performance indicator value is not an indication that the protection afforded by the plant's physical security organization is less than required by the regulatory requirements.

An effective access authorization (AA) system minimizes the potential for an internal threat. Basic elements of this program are the personnel screening program, the fitness-for-duty (FFD) program and the continual behavior observation program (referred to as CBOP). When there has been a programmatic failure or significant degradation in the AA system, the licensee is required to take corrective action and report the event to the regulator. These reportable events are the basis for the performance indicators (PI) that are used to monitor program effectiveness.

There is one performance indicator for the physical protection system, and two indicators for access authorization. The performance indicators are assessed against established thresholds using the data and methodology as established in this guideline. The NRC baseline inspections will validate and verify the testing requirements for each system to assure performance standards and testing periodicity are appropriate to provide valid data.

Performance Indicators:
The three physical protection performance indicators are:
1. Protected Area Security Equipment Performance Index,
2. Personnel Screening Program Performance, and
3. Fitness-for-Duty (FFD)/Personnel Reliability Program Performance.

The first indicator serves as a measure of a plant's ability to maintain equipment—to be available to perform its intended function. When compensatory measures are employed because a segment of equipment is unavailable—not adequately performing its intended function, there is no security vulnerability but there is an indication that something needs to be fixed. The PI provides trend indications for evaluation of the effectiveness of the maintenance process, and also provides a method of monitoring equipment degradation as a result of aging that might adversely impact reliability. Maintenance considerations for protected area and vital area portals are appropriately and sufficiently covered by the inspection program.

The remaining two indicators measure significant programmatic deficiencies in the access and trustworthiness programs. These programs verify that persons granted unescorted access to the protected area have satisfactorily completed personal screening and, as a result, are considered to be trustworthy and reliable. Each indicator is based on the number of reportable events, required by regulation, that reveal significant problems in the management and operation of the licensee's access authorization or fitness-for-duty programs.

PROTECTED AREA (PA) SECURITY EQUIPMENT PERFORMANCE INDEX

Purpose:

Operability of the PA security system is necessary to detect and assess safeguards events and to provide the first line of the defense-in-depth physical protection of the plant perimeter. In the event of an attempted encroachment, the intrusion detection system identifies the existence of the threat, the barriers provide a delay to the person(s) posing the threat and the alarm assessment system is used to determine the magnitude of the threat. The PI is used to monitor the unavailability of PA intrusion detection systems and alarm assessment systems to perform their intended function.

Indicator Definition:

PA Security equipment performance is measured by an index that compares the amount of the time CCTVs and IDS are unavailable, as measured by compensatory hours, to the total hours in the period. A normalization factor is used to take into account site variability in the size and complexity of the systems.

Data Reporting Elements:

Report the following site data for the previous quarter for each unit:

- Compensatory hours, CCTVs: The hours (expressed to the nearest tenth of an hour) expended in posting a security officer as required compensation for camera(s) unavailability because of degradation or defects.
- Compensatory hours, IDS: The hours (expressed to the nearest tenth of an hour) expended in posting a security officer as required compensation for IDS unavailability because of degradation or defects.
- CCTV Normalization factor: The number of CCTVs divided by 30. If there are 30 or fewer CCTVs, a normalization factor of 1 should be used.
- IDS Normalization factor: The number of physical security zones divided by 20. If there are 20 or fewer zones, a normalization factor of 1 should be used.

Calculation

The performance indicator is calculated using values reported for the previous four quarters. The calculation involves averaging the results of the following two equations.

$$\text{IDS Unavailability Index} = \frac{\text{IDS Compensatory hours in the previous 4 quarters}}{\text{IDS Normalization Factor x 8760 hrs}}$$

$$\text{CCTV Unavailability Index} = \frac{\text{CCTV Compensatory hours in the previous 4 quarters}}{\text{CCTV Normalization Factor x 8760 hrs}}$$

$$\text{Indicator Value} = \frac{\text{IDS Unavilability Index} + \text{CCTV Unavailability Index}}{2}$$

Definition of Terms

Intrusion detection system (IDS) - E-fields, microwave fields, *etc*.

CCTV - The closed circuit television cameras that support the IDS.

Normalization factors - Two factors are used to compensate for larger than nominal size sites.

- *IDS Normalization Factor*: Using a nominal number of physical security zones across the industry, the normalization factor for IDS is twenty. If a site has twenty or fewer intrusion detection zones, the normalization factor will be 1. If a site has more zones than 20, the factor is the total number of site zones divided by 20 (*e.g.*, 50 ÷ 20 = 2.5).
- *CCTV Normalization Factor*: Using a nominal number of perimeter cameras across the industry, the normalization factor for cameras is 30. If a site has thirty or fewer perimeter cameras, the normalization factor is 1. If a site has more than 30 perimeter cameras, the factor is the total number of perimeter cameras divided by 30 (*e.g.*, 50 ÷ 30 = 1.7).

> Note: The normalization factors are general approximations and may be modified as experience in the pilot program dictates.

Compensatory measures: Measures used to meet physical security requirements pending the return of equipment to service. Protected Area protection is not diminished by the use of compensatory measures for equipment unavailability.

Compensatory man-hours: The man-hours (expressed to the nearest tenth of an hour) that compensatory measures are in place (posted) to address a degradation in the IDS and CCTV systems. When a portion of the system becomes unavailable—incapable of performing its intended function—and requires posting of compensatory measures, the compensatory man-hour clock is started The period of time ends when the cause of the degraded state has been repaired, tested, and system declared operable.

If a zone is posted for a degraded IDS and a CCTV camera goes out in the same posted area , the hours for the posting of the IDS will not be double counted. However, if the IDS problem is corrected and no longer requires compensatory posting but the camera requires posting, the hours will start to count for the CCTV category.

Equipment unavailability: When the system has been posted because of a degraded condition (unavailability), the compensatory hours are counted in the PI calculation. If the degradation is caused by environmental conditions, preventive maintenance or scheduled system upgrade, the compensatory hours are not counted in the PI calculation. However, if the equipment is degraded after preventive maintenance or periodic testing, compensatory posting would be required and the compensatory hours would count. Compensatory hours stop being counted when the equipment deficiency has been corrected, equipment tested and declared back in service.

Clarifying Notes

Degradation: Required system/equipment/component is no longer available/capable of performing its intended safeguards function—manufacturer's equipment design capability and/or as covered in the PSP.

Extreme environmental conditions: Conditions beyond the design specifications of the system, including severe storms, heavy fog, heavy snowfall, and sun glare that renders the IDS or CCTV temporarily inoperable. However, if the equipment remains degraded after the environmental conditions have ended, the compensatory hours would then begin to be counted.

Other naturally occurring conditions that are beyond the control of the licensee, such as damage or nuisance alarms from animals are not counted.

Intended function: The ability of a component to detect the presence of an individual or display an image as intended by manufacturer's equipment design capability and/or as covered in the PSP.

Scheduled equipment upgrade: In the situation where system degradation results in a condition that cannot be corrected under the normal maintenance program (*e.g.*, engineering evaluation specifies the need for a system/component modification or upgrade), and the system requires compensatory posting, the compensatory hours stop being counted for the PI after such an evaluation has been made and the station has formally initiated the modification/upgrade action.

Preventative maintenance: Scheduled preventive maintenance (PM) on system/equipment/component to include probability and/or operability testing. Includes activities necessary to keep the system at the required functional level. Planned plant support activities are considered PM.

If during preventive maintenance or testing, a camera does not function correctly, and can be compensated for by means other than posting an officer, no compensatory man-hours are counted.

The indicator does not include protective measures associated with Independent Spent Fuel Storage Installations (ISFSIs).

Scheduled system upgrade: Activity to improve, upgrade or enhance system performance, as appropriate, in order to be more effective in its reliability or capability.

Frequently Asked Questions

ID Question

57 Reporting of Compensatory Hours for Multi-Unit Site

For a multi unit site how are the CCTV and IDS Compensatory Hours to be reported? Are they reported under only 1 unit, all units, divided between the units, or separately as a site-wide program?

Response

Information supporting performance indicators is reported on a per unit basis. For performance indicators that reflect site conditions, this requires that the information be repeated for each unit on the site.

ID Question

59 Comp Posting for Non-Failure of Equipment

For Security Intrusion Detection Systems (IDS), if the number of IDS segment false alarms exceeds 5 per hour, licensees declare the IDS segment inoperable (due to excessive false alarms. Note, these are not nuisance nor environmental alarms.), comp post the segment, repair/test the segment, return the segment to operable and remove the comp post. The question is, if an IDS segment is removed from service and comp posted, but the resultant maintenance does NOT disclose any malfunction and the system is returned to service with essentially no corrective maintenance (some minor tweaking of system sensitivity might be done since it is out of service, but for this discussion the sensitivity was not initially mis-set), do you count the comp posting hours against the metric.

Response

If there is no equipment malfunction and the system would still have alarmed during intrusion (still capable of performing its intended function), then the compensatory man hours that were established as part of a precautionary maintenance activity would not be counted.

ID Question

60 Multiple Comp Postings for Single Equipment Failure

If two IDS segments can be covered by a single comp post (one watchperson) then the guidance says to only count one hour (don't double count the single post). What if one IDS segment must be covered by 2 or more comp posts (two or more watchpersons), do you count one hour or the hours expended by the watchpersons (i.e., 2 or more per hour).

Response

Total compensatory man-hours should be counted. This performance indicator measures total man-hours of compensatory action vs. total hours of compensatory action.

ID Question

61 Comp Hours for Multiple Equipment Failures

Compensatory hours are not double counted when compensatory measures are assigned to multiple points (i.e. a single officer spending 4 hours watching both a camera and a zone). However, where are the comp hours assigned, to the camera or the zone. What If 1 MSF (Member of the Security Force) spent a total of 12.5 hours (one standard shift) on compensatory measures for malfunctioning equipment (0530 - 1800). Of the 12.5 hours = 0530 - 1400 MSF compensated for zone 4 (IDS) totaling 8.5 hrs 0700 - 1200 MSF compensated for camera 4 (CCTV) totaling 5 hrs 0900 - 1800 MSF compensated for camera 5 (CCTV) totaling 9 hrs How should we divide the hours up?

Response

Compensatory hours expended to address multiple equipment problems are assigned based upon the piece of equipment that first required compensatory hours. When this first piece of equipment is returned to service and no longer requires compensatory measures, the second piece of equipment carries the hours, etc. In the offered example, IDS-Zone 4 would be assigned 8.5 hours and CCTV-camera 5 would be assigned 4 hours.

ID Question

68 Compensatory Hours

If a compensatory measure such as positioning a Pan-Tilt-Zoom camera in an area that compensates for a out of service fixed zone camera, does that count against the Protected Area Security Equipment PI even though no additional man-hours are required for the compensatory measure.

Response

This indicator utilizes compensatory man-hours to provide an indication of CCTV and IDS unavailability. Other compensatory measures would not be counted as part of this indicator.

ID Question

77 Compensatory Hours

A previous FAQ question (FAQ 60) discusses one Intrusion Detection System (IDS) segment that must be covered by two or more compensatory posts (two or more watch persons) and if you count one hour or the hours expended by the watchpersons (i.e. two or more per hour). The response states that total compensatory man-hours should be counted and that this performance indicator measures total man-hours of compensatory action vs. total hours of compensatory action. At our Station, we have a situation where security persons are already in place at continuously manned remote location security booths around the perimeter of the site. In the event of a need to provide compensatory coverage for the loss IDS equipment, security persons already in these booths can fulfill this function. More than one person can be assigned to provide the coverage, since more than one person may be readily available. The question now becomes, do we need to count all of the persons that have been assigned to fulfill the compensatory function when some of the persons may have been assigned when it was not necessary to do so, but was done as a matter of convenience.

Response

Only the required compensatory man-hours should be counted. If more than one person is required to provide coverage due to the lost equipment, then the hours of each should be counted toward this indicator.

ID Question

80 Compensatory Hours

A licensee performs a routine surveillance on a security Intrusion Detection System (IDS) or Closed Circuit TV (CCTV). During the surveillance, the equipment is determined to be inoperable (not capable of performing its intended safety function). When does the inoperability start.

Response

The metric is based on the comp hours and starts when the IDS or CCTV is actually posted. There is no "fault exposure hours" or other consideration beyond the actual physical compensatory posting.

ID Question

81 Compensatory Hours

When determining the need to compensatory post an Intrusion Detection System when it can not perform its intended safety function, there are three types of failures: (1) inability to detect intrusion; (2) inability to detect IDS sabotage (i.e., tamper alarms); and (3) inability to note equipment problems (i.e., supervisory alarm). Clearly, items 1 and 2 are failures and compensatory hours should be counted; however, what about failures of the supervisory sub-system?

Response

IDS equipment issues that do not require compensatory hours would not be counted.

ID Question

82 Preventive Maintenance

In the security equipment PI, the terms corrective maintenance and Preventive maintenance are used. However, there is another subset of maintenance - predictive maintenance - and it is not clear whether to consider it preventative (exempt) or corrective (non-exempt). Predictive maintenance occurs on equipment that is currently performing its intended safety function satisfactorily (i.e., can pass surveillances and is OPERABLE), but has exhibited symptoms of declining performance (i.e., increased false alarms may indicate the need for insulator cleaning in advance of the routine PM cleaning or before eventual failure due to salt buildup; or a weak line signal may indicate the desirability of computer board replacement in advance of waiting for board failure).

Response

Predictive maintenance is treated as preventive maintenance. Since the equipment has not failed (remains capable of performing its intended detection (safety) function), any maintenance performed in advance of its actual failure is preventive. It is not the NRC's intent to create a disincentive to performing maintenance to ensure the security systems perform at their peak reliability and capability

ID Question

83 Extreme Environmental Conditions

How must we address extreme environmental conditions. A steady rain is not a "severe storm". "Sun glare" is not an extreme condition. Excessive summer heat reflecting off of a hot roof that renders the IDS inoperable for brief periods, although not an extreme environmental condition, inhibits proper operation for several consecutive days at about the same time. What if a heavy rain leaves a puddle of water that makes the IDS inoperable for several hours. Conservatively reporting environmental effects on protection equipment could cause an indicator to be unacceptable. If the clarifying note addressed "adverse environmental conditions", all weather related degradations would not be counted.

Response

The clarifying note is intended to allow exemption of compensatory hours that are required due to environmental conditions that exist beyond the design specifications of the system. The question to ask is, "Is the system performing in accordance with its design specifications?" If the system is not designed to function during certain instances of sun glare, the hours do not have to count.

ID Question

136 A CCTV camera is functioning properly, but lighting in an area is poor such that the camera cannot detect intrusion and compensatory actions are taken, do these hours count as part of the indicator?

Response

The camera requires lighting to perform its function, therefore the system is not operating as intended and the compensatory hours are counted.

ID Question

137 Should compensatory hours for the security computer and multiplexers be counted on the PI data being submitted.

Response

Compensatory hours for this PI cover hours expended in posting a security officer as required compensation for IDS and/or CCTV unavailability because of a degradation or defect. If problems with the security computer or multiplexer result in compensatory postings because the IDS/CCTV is no longer capable of performing its intended safeguards function, the hours would count.

ID Question

138 Do e-fields taken out of service to support plant operations (not failures) and where guards are posted, count as Security Equipment Performance indicator compensatory hours.

Response

No.

ID Question

139 **For the Security Equipment indicator, there is a paragraph entitled "Scheduled equipment upgrade". This paragraph requires that if a system cannot be corrected under normal maintenance program, compensatory hours stop being counted after a modification or upgrade has been initiated. For the case where there are a few particularly troubling zones that result in formal initiation of an entire system upgrade for all zones, should we stop counting compensatory hours for all zones until the upgrade is in place?**

Response

No, only subsequent failures that would have been prevented by the planned upgrade are excluded from the count. This exclusion applies regardless of whether the failures are in a zone that precipitated the upgrade action or not, as long as they are in a zone that will be affected by the upgrade, and the upgrade would have prevented the failure.

ID Question

140 **Is the performance indicator for IDS strictly looking at the protected area boundary or are vital doors included?**

Response

The Purpose paragraph establishes that the PI is for the plant perimeter.

ID Question

141 **NEI 99-02 guidance for the Protected Area Security Equipment Performance Indicator states that when extreme environmental conditions occur that render the IDS or CCTV temporarily inoperable, the compensatory hours are not counted. In summer months, the duration of environmental conditions is typically tied to the period of time associated with storm passage. In winter months, storm passage does not as clearly represent the duration, because significant accumulations of snow and ice can remain and be an impediment to system function far beyond the passage of the storm despite removal efforts. If the IDS and CCTV are not designed to operate under such conditions, should compensatory hours count?**

Response

Unavailabilities due to environmental conditions beyond the design specification of the system are not counted. If after the environmental condition clears, the zone remains unavailable, despite reasonable recovery efforts, the hours do not have to be counted.

ID Question

160 **If a security officer is posted to comp. for two zones for 1 hour, do you count 1 or 2 compensatory hours?**

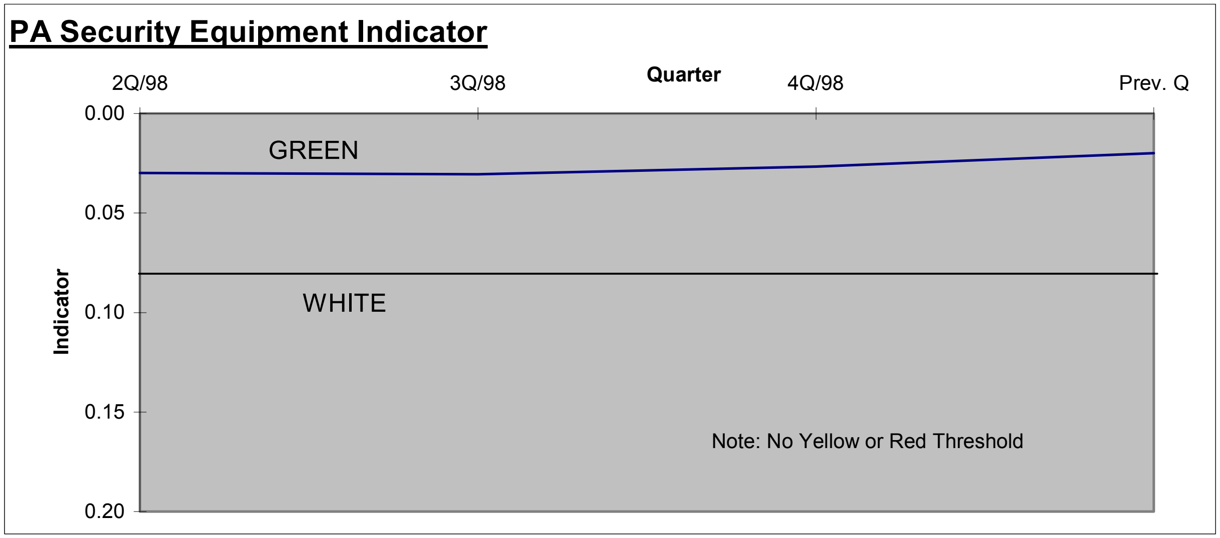
Response

If one security officer is posted to watch two zones for one hour, one (1) hour applies to the PI.

Data Example

Protected Area Security Equipment Performance Indicator

Quarter	2Q/97	3Q/97	4Q/97	1Q/98	2Q/98	3Q/98	4Q/98	Prev. Q
IDS Compensatory Hours in the qtr	36	48	96	126	65	45	60	55
CCTV Compensatory Hours in the qtr	24	36	100	100	48	56	53	31
IDS Compensatory Hrs in previous 4 qtrs				306	335	332	296	225
CCTV Compensatory Hrs in the previous 4 qtrs				260	284	304	257	188
IDS Normalization Factor	1.05	1.05	1.05	1.05	1.1	1.1	1.1	1.1
CCTV normalization Factor	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3
IDS Unavailability Index				0.033268	0.034765	0.034454	0.030718	0.02335
CCTV Unavailability Index				0.024734	0.024939	0.026695	0.022568	0.016509
					2Q/98	3Q/98	4Q/98	Prev. Q
Indicator Value				0.03	0.03	0.03	0.03	0.02



PERSONNEL SCREENING PROGRAM PERFORMANCE

Purpose:

The screening program performance indicator is used to verify that the unescorted access authorization program has been implemented pursuant to 10 CFR §§ 73.56 & 73.57 to evaluate trustworthiness of personnel prior to granting unescorted access to the protected area. The screening program includes psychological evaluation, an FBI criminal history check, a background check and reference check. The program should be able to verify that persons granted unescorted access to the protected area have satisfactorily completed personal screening and, as a result, are considered to be trustworthy and reliable.

Indicator Definition

The number of reportable failures to properly implement the regulatory requirements.

Data Reporting Elements

The number of failures to implement requirement(s) of 10 CFR Part 73 that were reportable during the previous quarter.

Calculation:

The indicator is a summation of the values reported for the previous four quarters.

Definition of Terms:

Reportable event: - a failure in the licensee's program that requires prompt regulatory notification. This is in contrast to a loggable event, which is not considered significant.

Clarifying Notes:

This indicator does not include any reportable events that result from the program operating as intended.

Frequently Asked Questions

ID Question

127 Clarifying Notes for both the Unescorted Access Authorization Program and FFD performance indicators imply that if an event is reported appropriately in accordance with either the reporting criteria of Part 26 or Part 73.55 then the program is working as designed and there is no event counted in the PI data. What then is the meaning/purpose of the sentence on page C-6 of the guidance document of the cornerstone document: "...data is currently available and there are regulatory requirements to report significant events"...?

Response

The sentence before the quoted piece used the term "program degradations." The intention is to keep the reported information in two groups:

- **Specific reports required by regulation (e.g., operator tested positive for drugs) which means the program is working as intended and not to be included in the PI, and**
- **Significant programmatic failures of the implemented regulatory requirements that would amount to one-hour type reports - these are the only reports included in the PIs for access authorization or fitness-for-duty.**

ID Question

128 For the Personnel Screening and Fitness for Duty indicator - it is not stated that the date to be used for reporting or what quarter to report an event in is the LER date. Is this an accurate assumption? This would be the same as the SSFF date requirement.

Response

The criterion for reporting of performance indicators is based on the time the failure or deficiency is identified, with the exception of the Safety System Functional Failure indicator, which is based on the Report Date of the LER.

ID Question

133 Personnel Screening Program Performance indicator: As written in NEI 99-002 it appears that this indicator only applies to reportable conditions in 10 CFR 73.56 & 57, but it needs to be absolutely clear.

Response

The PI applies to § 73.56 and 73.57 and not to all of Part 73.

ID Question

134 Should we include such things as "entry into a vital Area without proper authorization", or just the reporting requirements that would be reported if 10 CFR 73.56 or 10 CFR 73.57 were not met as outlined in Generic Letter 91-003 and NUREG 1304?"

Response

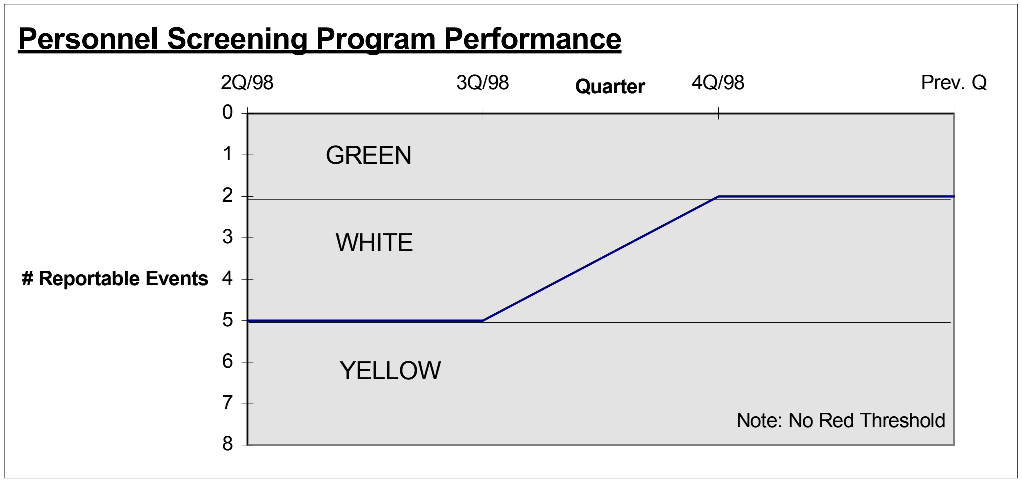
GL 91-03 and NUREG 1304 are not germane. The only Reportable event is that defined in the PI - "a failure in the licensee's program that requires prompt regulatory notification." If you did not make a one-hour report concerning a significant failure to meet regulation it is not included for PI purposes.

Data Examples

Personnel Screening Program Indicator

Quarter	2Q/97	3Q/97	4Q/97	1Q/98	2Q/98	3Q/98	4Q/98	Prev. Q
10 CFR §73.56 One Hr Reports	0	1	3	0	1	1	0	0
Reportable Events in previous 4 qtrs					2Q/98	3Q/98	4Q/98	Prev. Q
					5	5	2	2

Thresholds	
Green	≤2
White	>2
Yellow	>5



FITNESS-FOR-DUTY (FFD)/PERSONNEL RELIABILITY PROGRAM PERFORMANCE

Purpose:

The fitness-for-duty/personnel reliability program performance indicator is used to assess the implemented program for reasonable assurance that personnel are in compliance with associated requirements, 10 CFR Part 26 and § 73.56, to include: suitable inquiry, testing for substance abuse and behavior observation. This trustworthiness and reliability program is designed to minimize the potential for a person's performance or behavior to adversely affect his or her ability to safely and competently perform required duties.

Indicator Definition

The number of reportable failures to properly implement the requirements of 10 CFR Part 26 and 10 CFR 73.56.

Data Reporting Elements:

The number of failures to implement fitness-for-duty and behavior observation requirements, reportable during the previous quarter.

Calculation:

The indicator is a summation of the values reported for the previous four quarters.

Definition of Terms:

Reportable event: a failure in the licensee's program that requires prompt regulatory notification. This is in contrast to a loggable event, which is not considered significant.

Clarifying Notes:

This indicator does not include any reportable events that result from the program operating as intended.

Frequently Asked Questions

ID Question

58 Reporting of FFD/Personnel Screening Data for Multi-Site Program
When reporting data for FFD/personnel screening for a multi-site company for which personnel are tested for both sites, how is the data reported?

Response

The Personnel Screening Program Performance Indicator provides a measure of the effectiveness of programmatic efforts to implement regulatory requirements outlined in 10 CFR Part 73. Where a programmatic failure affected (or had the potential to affect) multiple sites, the instance is reported for each affected unit.

ID **Question**

127 **Clarifying Notes for both the Unescorted Access Authorization Program and FFD performance indicators imply that if an event is reported appropriately in accordance with either the reporting criteria of Part 26 or Part 73.55 then the program is working as designed and there is no event counted in the PI data. What then is the meaning/purpose of the sentence on page C-6 of the guidance document of the cornerstone document: "...data is currently available and there are regulatory requirements to report significant events"...?**

Response

The sentence before the quoted piece used the term "program degradations." The intention is to keep the reported information in two groups:

- **Specific reports required by regulation (e.g., operator tested positive for drugs) which means the program is working as intended and not to be included in the PI, and**
- **Significant programmatic failures of the implemented regulatory requirements that would amount to one-hour type reports - these are the only reports included in the PIs for access authorization or fitness-for-duty.**

ID **Question**

128 **For the Personnel Screening and Fitness for Duty indicator - it is not stated that the date to be used for reporting or what quarter to report an event in is the LER date. Is this an accurate assumption? This would be the same as the SSFF date requirement.**

Response

The criterion for reporting of performance indicators is based on the time the failure or deficiency is identified, with the exception of the Safety System Functional Failure indicator, which is based on the Report Date of the LER.

ID **Question**

129 **The clarifying note for the Fitness-For-Duty / Personnel Reliability Program Performance Indicator states that the indicator does not include any reportable events that result from the program operating as intended. What is not clear is whether all 10 CFR Part 26 reportable events count as data reporting elements or not. For example, if a contract supervisor is selected for a random drug test, tests positive, and we take the proper action, does this count as a data reporting element or not? One could say that the random drug test failure is a failure to implement the requirements of 10 CFR Part 26. Alternatively, one could say that the program functioned as intended and we complied with the requirements of 10 CFR Part 26.**

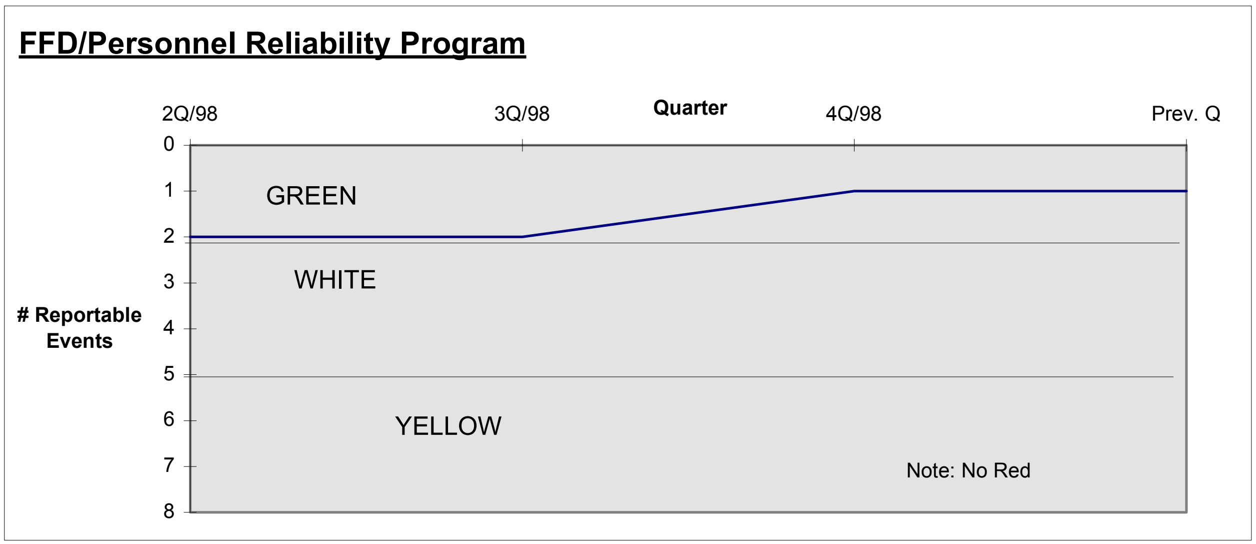
Response

No. The example would not count since the program was successful. Only count program failures.

Data Example

FFD/Personnel Reliability

Quarter	2Q/97	3Q/97	4Q/97	1Q/98	2Q/98	3Q/98	4Q/98	Prev. Q
10 CFR Part 26 Prompt Reports	0	1	1	0	0	1	0	0
					2Q/98	**3Q/98**	**4Q/98**	**Prev. Q**
Reportable Events in previous 4 qtrs					2	2	1	1
Thresholds								
Green	≤2							
White	>2							
Yellow	>5							
Red	N/A							



APPENDIX A

Acronyms & Abbreviations

AA	Access Authorization
AC	Alternating (Electrical) Current
AFW	Auxiliary Feedwater System
ALARA	As Low As Reasonably Achievable
ANS	Alert & Notification System
BWR	Boiling Water Reactor
CBOP	Behavior Observation Program
CFR	Code of Federal Regulations
CCTV	Closed Circuit Television
DC	Direct (Electrical) Current
DE & AEs	Drills, Exercises and Actual Events
EAL	Emergency Action Levels
EDG	Emergency Diesel Generator
EOF	Emergency Operations Facility
EFW	Emergency Feedwater
ERO	Emergency Response Organization
ESF	Engineered Safety Features
FBI	Federal Bureau of Investigations
FEMA	Federal Emergency Management Agency
FFD	Fitness for Duty
FSAR	Final Safety Analysis Report
FWCI	Feedwater Coolant Injection
IDS	Intrusion Detection System
ISFSI	Independent Spent Fuel Storage Installation
HPCI	High Pressure Coolant Injection
HPCS	High Pressure Core Spray
HPSI	High Pressure Safety Injection
HVAC	Heating, Ventilation and Air Conditioning
LER	Licensee event Report
LPCI	Low Pressure Coolant Injection
LOCA	Loss of Coolant Accident
MSIV	Main Steam Isolation Valve
N/A	Not Applicable
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
OSC	Operations Support Center
PA	Protected Area
PARs	Protective Action Recommendations
PI	Performance Indicator
PRA	Probabilistic Risk Analysis

PORV	Power Operated Relief Valve
PWR	Pressurized Water Reactor
RETS	Radiological Effluent Technical Specifications
RCIC	Reactor Core Isolation Cooling
RCS	Reactor Coolant System
RHR	Residual Heat Removal
SSFF	Safety System Functional Failure
SSU	Safety System Unavailability
TSC	Technical Support Center

APPENDIX B

STRUCTURE AND FORMAT OF NRC PERFORMANCE INDICATOR DATA FILES

Performance indicator data files submitted to the NRC as part of the Regulatory Oversight Process should conform to structure and format identified below. The NEI performance indicator Website (PIWeb) automatically produces files with structure and format outlined below.

File Naming Convention

Each NRC PI data file should be named according to the following convention. The name should contain the unit docket number, underscore, the date and time of creation and (if a change file) a "C" to indicate that the file is a change report. A file extension of .txt is used to indicate a text file.

Example: 05000399_20000103151710.txt

In the above example, the report file is for a plant with a docket number of 05000399 and the file was created on January 3, 2000 at 10 seconds after 3:17 p.m. The absence of a C at the end of the file name indicates that the file is a quarterly data report.

General Structure

Each line of the report begins with a left bracket (e.g., "[") and ends with a right bracket (e.g., "]"). Individual items of information on a line (elements) are separated by a vertical "pipe" (e.g., "|").

Each file begins with [BOF] as the first line and [EOF] as the last line. These indicate the beginning and end of the data file. The file may also contain one or more "buffer" lines at the end of the file to minimize the potential for file corruption. The second line of the file contains the unit docket number and the date and time of file creation (e.g., [05000399|1/2/2000 14:20:32]). Performance indicator information is contained beginning with line 3 through the next to last line (last line is [EOF]). The information contained on each line of performance indicator information consists of the performance indicator ID, applicable quarter/year (month/year for Barrier Integrity indicators), comments, and each performance indicator data element. Table B-1 provides a description of the data elements and order for each line of performance indicator data in a report file.

Example:
[IE01|3Q1998|Comments here|2|2400]

In the above example, the line contains performance indicator data for Unplanned Scrams per 7000 Critical Hours (IE01), during the 3rd quarter of 1998. The applicable comment text is "Comments here". The data elements identify that (see Table B-1) there were 2 unplanned automatic and manual scrams while critical and there were 2400 hours of critical operation during the quarter.

TABLE B-1 – PI DATA ELEMENTS IN NRC DATA REPORT

Performance Indicator	Data Element Number	Description
General Comment	1	Performance Indicator Flag (i.e., GEN)
	2	Report quarter and year (e.g., 1Q2000)
	3	Comment text
Unplanned Scrams per 7,000 Critical Hours	1	Performance Indicator Flag (i.e., IE01)
	2	Quarter and year (e.g., 1Q2000)
	3	Comment text
	4	Number of unplanned automatic and manual scrams while critical in the reporting quarter
	5	Number of hours of critical operation in the reporting quarter
Scrams with Loss of Normal Heat Removal	1	Performance Indicator Flag (i.e., IE02)
	2	Quarter and year (e.g., 1Q2000)
	3	Comment text
	4	The number of automatic and manual scrams while critical in the reporting quarter in which the normal heat removal path through the main condenser was lost
Unplanned Power Changes per 7,000 Critical Hours	1	Performance Indicator Flag (i.e., IE03)
	2	Quarter and year (e.g., 1Q2000)
	3	Comment text
	4	Number of unplanned power changes, excluding scrams, during the reporting quarter
	5	Number of hours of critical operation in the reporting quarter
Safety System Unavailability (SSU), Emergency AC Power System	1	Performance Indicator Flag (i.e., MS01)
	2	Quarter and year (e.g., 1Q2000)
	3	Comment text
	4	Planned Unavailable Hours
	5	Unplanned Unavailable Hours
	6	Fault Exposure Unavailable Hours
	7	Hours Train Required for Service
	*	Items 4 to 7 are repeated for each train
Safety System Unavailability (SSU), High Pressure Injection System	1	Performance Indicator Flag (i.e., MS02)
	2	Quarter and year (e.g., 1Q2000)
	3	Comment text
	4	Planned Unavailable Hours
	5	Unplanned Unavailable Hours
	6	Fault Exposure Unavailable Hours
	7	Hours Train Required for Service
	*	Items 4 to 7 are repeated for each train
Safety System Unavailability (SSU), Heat Removal System	1	Performance Indicator Flag (i.e., MS03)
	2	Quarter and year (e.g., 1Q2000)
	3	Comment text

Performance Indicator	Data Element Number	Description
	4 5 6 7 *	Planned Unavailable Hours Unplanned Unavailable Hours Fault Exposure Unavailable Hours Hours Train Required for Service Items 4 to 7 are repeated for each train
Safety System Unavailability (SSU), Residual Heat Removal System	1	Performance Indicator Flag (i.e., MS04)
	2	Quarter and year (e.g., 1Q2000)
	3	Comment text
	4 5 6 7 *	Planned Unavailable Hours Unplanned Unavailable Hours Fault Exposure Unavailable Hours Hours Train Required for Service Items 4 to 7 are repeated for each train
Safety System Functional Failures	1	Performance Indicator Flag (i.e., MS05)
	2	Quarter and year (e.g., 1Q2000)
	3	Comment text
	4	Number of safety system functional failures during the reporting quarter
Reactor Coolant System Activity (RCSA)	1	Performance Indicator Flag (i.e., BI01)
	2	Month and year (e.g., 3/2000)
	3	Comment text
	4 5	Maximum calculated RCS activity, in micro curies per gram dose equivalent Iodine 131, as required by technical specifications, for reporting month Technical Specification limit for RCS activity in micro curies per gram does equivalent Iodine 131
Reactor Coolant System Identified Leakage (RCSL)	1	Performance Indicator Flag (i.e., BI02)
	2	Month and year (e.g., 3/2000)
	3	Comment text
	4 5	Maximum RCS Identified Leakage calculation for reporting month in gpm Technical Specification limit for RCS Identified Leakage in gpm
Emergency Response Organization Drill/Exercise Performance	1	Performance Indicator Flag (i.e., EP01)
	2	Quarter and year (e.g., 1Q2000)
	3	Comment text
	4 5	Number of drill, exercise and actual event opportunities performed timely and accurately during the reporting quarter Number of drill, exercise and actual event opportunities during the reporting quarter
Emergency Response Organization (ERO) Participation	1	Performance Indicator Flag (i.e.,EP02)
	2	Quarter and year (e.g., 1Q2000)
	3	Comment text
	4 5	Total Key ERO members that have participated in a drill, exercise, or actual event in the previous 8 qrtrs Total number of Key ERO personnel at end of reporting quarter
Alert & Notification System Reliability	1	Performance Indicator Flag (i.e., EP03)

Performance Indicator	Data Element Number	Description
	2	Quarter and year (e.g., 1Q2000)
	3	Comment text
	4	Total number of successful ANS siren-tests during the reporting quarter
	5	Total number of ANS sirens tested during the reporting quarter
Occupational Exposure Control Effectiveness	1	Performance Indicator Flag (i.e., OR01)
	2	Quarter and year (e.g., 1Q2000)
	3	Comment text
	4	Number of technical specification high radiation area occurrences during the reporting quarter
	5	Number of very high radiation area occurrences during the reporting quarter
	6	The number of unintended exposure occurrences during the reporting quarter
RETS/ODCM Radiological Effluent Indicator	1	Performance Indicator Flag (i.e., PR01)
	2	Quarter and year (e.g., 1Q2000)
	3	Comment text
	4	Number of RETS/ODCM occurrences in the quarter
Protected Area Security Equipment Performance Indicator	1	Performance Indicator Flag (i.e., PP01)
	2	Quarter and year (e.g., 1Q2000)
	3	Comment text
	4	IDS Compensatory Hours in the quarter
	5	CCTV Compensatory Hours in the quarter
	6	IDS Normalization Factor
	7	CCTV Normalization Factor
Personnel Screening Program Indicator	1	Performance Indicator Flag (i.e., PP02)
	2	Quarter and year (e.g., 1Q2000)
	3	Comment text
	4	10 CFR §73.56 One Hr Reports
FFD/Personnel Reliability	1	Performance Indicator Flag (i.e., PP03)
	2	Quarter and year (e.g., 1Q2000)
	3	Comment text
	4	Number of failures to implement fitness-for-duty and behavior observation requirements, reportable during the reporting quarter.

1

APPENDIX C

Background Information and Cornerstone Development

INTRODUCTION

This section discusses the overall objectives and basis for the performance indicators used for each of the six cornerstone areas. A more in-depth discussion of the background behind each of the performance indicators identified in the main report may be found in SECY 99-07.

INITIATING EVENTS CORNERSTONE

GENERAL DESCRIPTION

The objective of this cornerstone is to limit the frequency of those events that upset plant stability and challenge critical safety functions, during shutdown as well as power operations. When such an event occurs in conjunction with equipment and human failures, a reactor accident may occur. Licensees can therefore reduce the likelihood of a reactor accident by maintaining a low frequency of these initiating events. Such events include reactor trips due to turbine trip, loss of feedwater, loss of offsite power, and other reactor transients. There are a few key attributes of licensee performance that determine the frequency of initiating events at a plant.

PERFORMANCE INDICATORS

PRAs have shown that risk is often determined by initiating events of low frequency, rather than those that occur with a relatively higher frequency. Such low-frequency, high-risk events have been considered in selecting the PIs for this cornerstone. All of the PIs used in this cornerstone are counts of either initiating events, or transients that could lead to initiating events (see Table 1). They have face validity for their intended use because they are quantifiable, have a logical relationship to safety performance expectations, are meaningful, and the data are readily available. The PIs by themselves are not necessarily related to risk. They are however, the first step in a sequence which could, in conjunction with equipment failures, human errors, and off-normal plant configurations, result in a nuclear reactor accident. They also provide indication of problems that, if uncorrected, increase the risk of an accident. In most cases, where PIs are suitable for identifying problems, they are sufficient as well, since problems that are not severe enough to cause an initiating event (and therefore result in a PI count) are of low risk significance. In those cases, no baseline inspection is required (the exception is shutdown configuration control, for which supplemental baseline inspections is necessary).

MITIGATING SYSTEMS CORNERSTONE

GENERAL DESCRIPTION

The objective of this cornerstone is to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). When such an event occurs in conjunction with equipment and human failures, a reactor accident may result. Licensees therefore reduce the likelihood of reactor accidents by enhancing the availability and reliability of mitigating systems. Mitigating systems include those systems associated with safety injection, residual heat removal, and emergency AC power. This cornerstone includes mitigating systems that respond to both operating and shutdown events.

PERFORMANCE INDICATORS

While safety systems and components are generally thought of as those that are designed for design-basis accidents, not all mitigating systems have the same risk importance. PRAs have shown that risk is often influenced not only by front-line mitigating systems, but also by support systems and equipment. Such systems and equipment, both safety- and nonsafety-related, have been considered in selecting the PIs for this cornerstone. The PIs are all direct counts of either mitigating system availability or reliability or surrogates of mitigating system performance. They have face validity for their intended use because they are quantifiable, have a logical relationship to safety performance expectations, are meaningful, and the data are readily available. Not all aspects of licensee performance can be monitored by PIs. Risk-significant areas not covered by PIs will be assessed through inspection.

BARRIER INTEGRITY CORNERSTONE

GENERAL DESCRIPTION

The purpose of this cornerstone is to provide reasonable assurance that the physical design barriers (fuel cladding, reactor coolant system, and containment) protect the public from radionuclide releases caused by accidents or events. These barriers play an important role in supporting the NRC Strategic Plan goal for nuclear reactor safety, “Prevent radiation-related deaths or illnesses due to civilian nuclear reactors.” The defense in depth provided by the physical design barriers which comprise this cornerstone allow achievement of the reactor safety goal.

PERFORMANCE INDICATORS

The performance indicators for this cornerstone cover **two of** the three physical design barriers. The first barrier is the fuel cladding. Maintaining the integrity of this barrier prevents the release of radioactive fission products to the reactor coolant system, the second barrier. Maintaining the integrity of the reactor coolant system reduces the likelihood of loss of coolant accident initiating events and prevents the release of radioactive fission products to the containment atmosphere in transients and other events. **Performance indicators for reactor coolant system activity and reactor coolant system leakage monitor the integrity of the first two physical design**

barriers. Even if significant quantities of radionuclides are released into the containment atmosphere, maintaining the integrity of the third barrier, the containment, will limit radioactive releases to the environment and limit the threat to the public health and safety. **The integrity of the containment barrier is ensured through the inspection process.**

Therefore, there are three desired results associated with the barrier integrity cornerstone. These are to maintain the functionality of the fuel cladding, the reactor coolant system, and the containment.

EMERGENCY PREPAREDNESS CORNERSTONE

GENERAL DESCRIPTION

Emergency Preparedness (EP) is the final barrier in the *defense in depth* approach to safety that NRC regulations provide for ensuring the adequate protection of the public health and safety. Emergency Preparedness is a fundamental cornerstone of the Reactor Safety Strategic Performance Area. 10 CFR Part 50.47 and Appendix E to Part 50, define the requirements of an EP program and a licensee commits to implementation of these requirements through an Emergency Plan (the Plan). The performance indicators for this cornerstone are designed to ensure that the licensee is capable of implementing adequate measures to protect the public health and safety in the event of a radiological emergency.

PERFORMANCE INDICATORS

Compliance of EP programs with regulation is assessed through observation of response to simulated emergencies and through routine inspection of onsite programs. Demonstration exercises involving onsite and offsite programs, form the key observational tool used to support, on a continuing basis, the reasonable assurance finding that *adequate protective measures can and will be taken in the event of a radiological emergency*. This is especially true for the most risk significant facets of the EP program. This being the case, the PIs for onsite EP draw significantly from performance during simulated emergencies and actual declared emergencies, but are supplemented by direct NRC inspection and inspection of licensee self assessment. NRC assessment of the adequacy of offsite EP will rely (as it does currently) on regular FEMA evaluations.

OCCUPATIONAL EXPOSURE CORNERSTONE

GENERAL DESCRIPTION

This cornerstone includes the attributes and the bases for adequately protecting the health and safety of workers involved with exposure to radiation from licensed and unlicensed radioactive material during routine operations at civilian nuclear reactors. The desired result is the adequate protection of worker health and safety from this exposure. The cornerstone uses as its bases the occupational dose limits specified in 10 CFR 20 Subpart C and the operating principle of maintaining worker exposure “as low as reasonably achievable (ALARA)” in accordance with 10 CFR 20.1101. These radiation protection criteria are based upon the assumptions that a linear relationship, without threshold, exists between dose and the probability of stochastic health effects (radiological risk); the severity of each type of stochastic health effect is independent of dose; and nonstochastic radiation-induced health effects can be prevented by limiting exposures below thresholds for their induction. Thus, 10 CFR Part 20 requires occupational doses to be maintained ALARA with the exposure limits defined in 10 CFR 20 Subpart C constituting the maximum allowable radiological risk. Industry experience has shown that the occurrences of uncontrolled occupational exposure that potentially could result in an individual exceeding a dose limit have been low frequency events. These potential overexposure incidents are associated with radiation fields exceeding 1000 millirem per hour (mrem/hr) and have involved the loss of one or more radiation protection controls (barriers) established to manage and control worker exposure. The probability of undesirable health effects to workers can be maintained within acceptable levels by controlling occupational exposures to radiation and radioactive materials to prevent regulatory overexposures and by implementing an aggressive and effective ALARA program to monitor, control and minimize worker dose.

PERFORMANCE INDICATORS

A combined performance indicator is used to assess licensee performance in controlling worker doses during work activities associated with high radiation fields or elevated airborne radioactivity areas. The PI was selected based upon its ability to provide an objective measure of an uncontrolled measurable worker exposure or a loss of access controls for areas having radiation fields exceeding 1000 millirem per hour (mrem/hr). The data for the PI are currently being collected by most licensees in their corrective action programs. The PI either directly measures the occurrence of unanticipated and uncontrolled dose exceeding a percentage of the regulatory limits or identifies the failure of barriers established to prevent unauthorized entry into those areas having dose rates exceeding 1000 mrem/hr. The indicator may identify declining performance in procedural guidance, training, radiological monitoring, and in exposure and contamination control prior to exceeding a regulatory dose limit. The effectiveness of the licensee's assessment and corrective action program is considered a cross-cutting issue and is addressed elsewhere.

PUBLIC EXPOSURE CORNERSTONE

GENERAL DESCRIPTION

This cornerstone includes the attributes and the bases for adequately protecting public health and safety from exposure to radioactive material released into the public domain as a result of routine civilian nuclear reactor operations. The desired result is the adequate protection of public health and safety from this exposure. These releases include routine gaseous and liquid radioactive effluent discharges, the inadvertent release of solid contaminated materials, and the offsite transport of radioactive materials and wastes. The cornerstone uses as its bases, the dose limits for individual members of the public specified in 10 CFR 20, Subpart D; design objectives detailed in Appendix I to 10 CFR Part 50 which defines what doses to members of the public from effluent releases are "as low as reasonably achievable" (ALARA); and the exposure and contamination limits for transportation activities detailed in 10 CFR Part 71 and associated Department of Transportation (DOT) regulations. These radiation protection standards require doses to the public be maintained ALARA with the regulatory limits constituting the maximum allowable radiological risk based on the linear relationship between dose received and the probability of adverse health effects.

PERFORMANCE INDICATORS

One PI for the radioactive effluent release program has been initially developed to monitor for inaccurate or increasing projected offsite doses. The effluent radiological occurrence (ERO) PI does not evaluate performance of the radiological environmental monitoring program (REMP) which will be assessed through the routine baseline inspection. For transportation activities, the infrequent occurrences of elevated radiation or contamination limits in the public domain from this measurement area precluded identification of a corresponding indicator. A second PI has been proposed for future use to monitor the inadvertent release of potentially contaminated materials which could result in a measurable dose to a member of the public. These indicators will provide partial assessments of licensee radioactive effluent monitoring and offsite material release activities and were selected to identify decreasing performance prior to exceeding public regulatory dose limits.

PHYSICAL SECURITY CORNERSTONE

GENERAL DESCRIPTION

This cornerstone addresses the attributes and establishes the basis to provide assurance that the physical protection system can protect against the design basis threat of radiological sabotage as defined in 10 CFR 73.1(a). The key attributes in this cornerstone are based on the defense in depth concept and are intended to provide protection against both external and internal threats. To date, there have been no attempted assaults with the intent to commit radiological sabotage and, although there has been no PRA work done in the area of safeguards, it is assumed that there exists a small probability of an attempt to commit radiological sabotage. Although radiological sabotage is assumed to be a small probability, it is also assumed to be risk significant since a successful sabotage attempt could result in initiating an event with the potential for disabling of the safety systems necessary to mitigate the consequences of the event with substantial consequence to public health and safety. An effective security program decreases the risk to public health and safety associated with an attempt to commit radiological sabotage.

PERFORMANCE INDICATORS

Three performance indicators are used to assess licensee performance in the Physical Protection and Access Authorization Systems. The PIs were selected based on their ability to provide objective measures of performance.

The performance of the physical protection system will be measured by the percent of the time all components (barriers, alarms and assessment aids) in the systems are available and capable of performing their intended function. When systems are not available and capable of performing their intended function, compensatory measures must be implemented. Compensatory measures are considered acceptable pending equipment being returned to service, but historically have been found to degrade over time. The degradation of compensatory measures over time, along with the additional costs associated with implementation of compensatory measures provides the incentive for timely maintenance/I&C support to return equipment to service. The percent of time equipment is available and capable of performing its intended function will provide data on the effectiveness of the maintenance process and also provide a method of monitoring equipment degradation as a result of aging that could adversely impact on reliability.

Two performance indicators are used to measure the Assess Authorization System. The performance indicators for this system will count the number of reportable events that reflect program degradations. This data is currently available and there are regulatory requirements to report significant events in the areas of Personnel Screening and FFD. The Behavior Observation significant events are captured in the FFD reporting requirements.

GENERAL FAQS

This section provides a general discussion of the Performance Indicator (PI) portion of the oversight and assessment process in a question/answer format.

How will Performance Indicators be used? (FAQ ID 113)

Nuclear plant performance will be measured by a combination of objective performance indicators and by the NRC inspection program which will be refocused on those plant activities which have the greatest impact on safety and overall risk.

Performance indicators use objective data to monitor each of the "cornerstone" areas. The data that make up the performance indicators will be generated by the utilities and submitted to the NRC. The NRC will also monitor plant activities through its inspection program both to verify the accuracy of the performance indicator information and to assess performance that is not measured by the performance indicators.

NRC activities beyond baseline inspection activities will be based upon licensee performance as measured by the performance indicators in conjunction with results from baseline inspection activities. Four performance thresholds have been established to allow unambiguous observation and assessment of declining (or improving) performance. The *Licensee Response Band* (or GREEN band) is characterized by acceptable performance in which cornerstone objectives are met. Performance problems would not be of sufficient significance that escalated NRC engagement would occur. Licensees would have maximum flexibility to manage corrective action initiatives. The *Increased Regulatory Response Band* (or WHITE band) would be entered when licensee performance is outside the normal performance range, but would still represent an acceptable level of performance, but there is indication of declining performance and reduced safety limits. The *Required Regulatory Response Band* (or YELLOW band) involves more significant decline in performance but licensee performance is, in general, still considered acceptable, if marginal. The *Unacceptable Performance Band* (or RED band) is entered when performance falls below the YELLOW band threshold. Plant performance is considered to be significantly outside the design basis, with unacceptable margin(s) to safety, with an accompanied loss of confidence that public health and safety would be assured with continued operation. It should be noted that although not expected, should a licensee's performance reach what has been determined to be an unacceptable level, margin would still exist before an undue risk to public health and safety would be presented. The extent of NRC actions would be graded based upon the relative deviation from the performance indicator threshold and the number of thresholds exceeded. A complete listing of the performance indicators selected for each cornerstone, along with performance thresholds is provided in Table 1 in the main body of this report.

WHAT IS THE GENERAL INTENT OF PERFORMANCE INDICATORS? (FAQ ID 114)

Performance indicators together with risk-informed baseline inspections, are intended to provide a broad sample of data to assess licensee performance in the risk significant areas of each cornerstone. They are not intended to provide complete coverage of every aspect of plant design and operation. It is recognized that licensees have the primary responsibility for ensuring the safety of the facility. Objective performance evaluation thresholds are intended to be used to help determine the level of regulatory engagement appropriate to licensee performance in each cornerstone area. Furthermore, based on past experience it is expected that a limited number of risk-significant events will continue to occur with little or no indication of declining performance. Follow-up inspections will be conducted to ensure that the cause of the event is well understood and licensee corrective actions are adequate to prevent recurrence. The results of these follow-up inspections will be factored into the assessment process along with performance indicators and risk informed baseline inspections.

HOW WERE THE PERFORMANCE INDICATORS DETERMINED? (FAQ ID 115)

Where possible, the NRC sought to identify performance indicators as a means of measuring the performance of key attributes in each of the cornerstone areas. In selecting performance indicators, the NRC tried to select indicators that: (1) were capable of being objectively measured; (2) allowed for the establishment of a risk-informed threshold to guide NRC and licensee actions; (3) provided a reasonable sample of performance in the area being measured; (4) represented a valid and verifiable indication of performance in the area being measured; (5) would encourage appropriate licensee and NRC actions; and (6) would provide sufficient time for the NRC and licensees to correct performance deficiencies before the deficiencies posed an undue risk to public health and safety. Where such a performance indicator could not be identified, "complementary" inspection activity will be used. Where a performance indicator was identified but was not sufficiently comprehensive to cover all performance areas to be measured, the NRC will use "supplementary" inspection activities. The NRC also identified areas where "verification" type inspections will be performed to verify the accuracy and completeness of the reported performance indicator data.

HOW WERE THE PERFORMANCE INDICATOR THRESHOLDS VALUES ESTABLISHED? (FAQ ID 116)

For two PIs (transients and safety system failures), no thresholds have been identified for the Required Regulatory Response Band or the Unacceptable Performance Band because the indicators could not be directly tied to risk data. These two indicators have provided good correlation with plant performance in the past and they are considered to be leading indicators of the more risk-significant indicators (scrams, risk-significant scrams, and SSU). The barrier integrity cornerstone PIs (RCS activity **and** RCS leak rate) do not have thresholds identified for the Unacceptable Performance Band because their lower thresholds are based on regulatory requirements (technical specifications). Individual plant technical specifications would require plant shutdown within a short time after the regulatory limits were exceeded. The emergency preparedness, radiation safety, and safeguards cornerstones do not have thresholds identified for the Unacceptable Performance Band. There is no risk basis for a determination that a certain degraded level of performance reflected by these indicators can be correlated into mandatory plant shutdown. It is expected that declining performance in the areas monitored by these indicators would be arrested by increased licensee corrective actions and by increased NRC attention up to and including the issuance of orders.

For some indicators, such as those for scrams and safety system unavailability, selection of the performance indicator thresholds was made using the insights from probabilistic risk assessment (PRA) sensitivity analysis. Other performance indicator thresholds could not be assessed using PRA models. In such cases, the performance indicator thresholds were tied to regulatory requirements or were based on the professional judgment of the NRC staff and industry. For example, under the barrier integrity cornerstone, reactor coolant system activity is a good measure of the integrity of the fuel cladding, but the performance thresholds chosen were based on technical specifications. Under the physical security cornerstone, the availability of physical protection systems provides a useful measure of the status of intrusion detection equipment, but its thresholds were chosen based on professional judgment of the NRC staff and industry representatives. Additional information on the establishment of thresholds for individual performance indicators is provided in SECY 99-007

HOW DO THE THRESHOLDS COMPARE WITH PAST INDUSTRY PERFORMANCE? (FAQ ID 117)

Following selection of performance indicators and corresponding thresholds, the NRC performed a benchmarking analysis to compare the indicators against several plants that had been previously designated by the agency as having either poor, declining, average, or superior performance. The analysis indicated that the performance indicators could generally differentiate between poor and superior plants, but were not as effective at differentiating average levels of performance. The transients and safety system failure performance indicators appeared to be the most closely tied with prior NRC judgments about performance. In some instances, the cause of the plants rated poorly by the agency was due to design or other issues for which valid performance indicators have not been developed. It is expected that these plants would continue to be identified by the inspection program.

The NRC also identified aspects of licensee performance such as human performance, the establishment of a safety conscious work environment, common cause failure, and the effectiveness of licensee problem identification and corrective action programs, that are not identified as specific cornerstones, but are important to meeting the safety mission. The NRC concluded that these items generally manifest themselves as the root causes of performance problems. Adequate licensee performance in these crosscutting areas will be assessed either explicitly in each cornerstone area or will be inferred through cornerstone performance results from both PIs and inspection results.

Lastly, the selected PIs were put through a benchmarking exercise that involved evaluation of an industry sponsored assessment and independent NRC staff analyses. This benchmarking was performed for a selection of plants with a history of poor, declining, average, and superior performance as determined by the NRC's senior management meetings.

WILL THE THRESHOLD VALUES CHANGE? (FAQ ID 118)

The current assessment of PI thresholds is based on a relatively small number of sensitivity studies, using PRA models of differing levels of detail. They show significant differences in results. The selected threshold values are somewhat conservative for most but not all plants. Efforts are underway to better understand these results, and to determine whether the thresholds should be modified or whether separate thresholds should be established for plant classes.

ARE OTHER INDICATORS BEING DEVELOPED? (FAQ ID 119)

Several additional PIs have been proposed, however further work is needed to determine whether these proposed PIs are viable and can provide meaningful licensee performance insights. These new indicators will either augment or replace existing indicators and when implemented will likely reduce activities currently addressed through the baseline inspection program.

An indicator is being developed to address shutdown operations as part of the Initiating Event Cornerstone. This indicator would count the events that jeopardize the capability to remove decay heat from the reactor while shut down or could lead to unplanned criticality. Experience has shown that plant activities while shut down with safety equipment out of service can, under certain circumstances, have serious consequences. It is important that reactor coolant level and temperature be controlled to maintain the heat removal capability and to prevent inadvertent criticality.

An indicator is being developed to measure the reliability of the safety significant systems currently being measured by the Safety System Unavailability performance indicator and an separate indicator is also being developed to measure the availability of key safety system functions during shutdown operations.

IS THERE A PROCESS THAT WILL ALLOW THE NRC TO SEE DECREASING PERFORMANCE EVEN IF THE UTILITY STAYS GREEN? (FAQ ID 120)

The Performance Indicators are only a part of the overall oversight process. A “green” performer should be allowed to identify and correct perceived problems. The utility’s process of identifying problems and the timeliness of corrective actions will be inspected.

INDIVIDUAL PLANT EXAMINATIONS (IPES) WERE ESTABLISHED USING A CERTAIN SET OF PRA ASSUMPTIONS. THESE INCLUDED ASSUMPTIONS REGARDING THE AVAILABILITY OF EQUIPMENT THAT PERFORM SAFETY FUNCTIONS. THE CRITERIA USED FOR AVAILABILITY DECISIONS HAVE VARYING DEGREES OF CONSERVATISM FROM PLANT-TO-PLANT. IN SOME CASES, THESE CRITERIA MAY BE LESS STRINGENT THAN CRITERIA CURRENTLY USED IN NEI 99-02 REV D FOR DETERMINING THE AVAILABILITY OF EQUIPMENT WITHIN THE SCOPE OF MITIGATING SYSTEMS. HOWEVER, THESE LESS STRINGENT CRITERIA GIVE A MORE ACCURATE REPRESENTATION OF RISK IF THEY ACCURATELY DETERMINE THE ACTUAL STATUS OF EQUIPMENT AVAILABILITY TO PERFORM ITS FUNCTION.IT'S POSSIBLE THAT THESE LESS STRINGENT CRITERIA ARE STILL BEING USED ON A DAY-TO-DAY BASIS (E.G., TO ESTABLISH RISK PROFILES FOR ON-LINE MAINTENANCE). HAS THIS POTENTIAL CONFLICT BEEN RECOGNIZED (USING DIFFERENT

DECISION CRITERIA FOR AVAILABILITY OF THE SAME EQUIPMENT, DEPENDING UPON WHAT PROCESS IS MAKING THE DECISION)? IS THERE AN EXPECTATION TO RECONCILE THIS? WHAT EFFECT DOES THIS HAVE UPON A PLANT'S PRA IF RISK ASSUMPTIONS ARE NO LONGER VALID USING 99-02 CRITERIA? IS THERE AN EXPECTATION THAT AVAILABILITY DECISIONS FOR EQUIPMENT OUTSIDE THE SCOPE OF THE PERFORMANCE INDICATORS BE CONSISTENT WITH 99-02 CRITERIA? (FAQ ID 67)

It is recognized that there are differences in definitions between the NRC PIs, WANO indicators, maintenance rule, and IPEs. Industry and NRC will be working in year 2000 to try to reconcile indicator definitions. NEI 99-02 applies to NRC PIs and not to operability decisions or your PRA.

WHEN SHOULD QUARTERLY PERFORMANCE INDICATOR REPORTS BE SUBMITTED WHEN THE NORMAL SUBMITTAL DATE FALLS ON A SATURDAY, SUNDAY, OR HOLIDAY? (FAQ ID 121)

The performance indicator data reports are submitted to the NRC under 10 CFR 50.4 requirements. Per 10 CFR 50.4, if a submittal due date falls on Saturday, Sunday, or Federal holiday, the next Federal working day becomes the official due date.

APPENDIX D

Plant Specific Design Issues

This appendix identifies resolutions to performance indicator reporting issues that are specific to individual plant designs.

Oyster Creek

Issue: Oyster Creek does not have a high pressure coolant injection system. The function performed by the HPCI system is accomplished at the Oyster Creek station by a combination of pressure reduction using the Automatic Depressurization System (ADS) and injecting coolant into the vessel using the Core Spray System (low pressure coolant injection). The core spray system consists of two redundant trains each having redundant active components (pumps and valves).

Resolution: For the HPCS indicator, Oyster Creek will report system availability of the Core Spray System and consider ADS as a support function required for system operability. Note: Technical Specifications for Oyster Creek require plant shutdown if ADS is inoperable.

At this point, Oyster Creek will consider core spray as a two train system and consider similar configurations at other plants, the WANO definition, and how unavailability is reported to WANO.

Dresden Station

Issue: At Dresden Station, the RHR function as defined in NEI 99-02 is accomplished using both the Low Pressure Coolant Injection (LPCI) and the Shutdown Cooling (SDC) Systems. LPCI performs the suppression pool heat removal function while SDC performs the reactor core decay heat removal function.

The LPCI System has two parallel heat exchangers and the SDC System consists of three 100% capacity parallel trains. The configuration of the SDC system can be treated as two trains with one installed spare train as described in Section 2.2 of NEI 99-02.

Resolution: Dresden is utilizing two trains of LPCI and two trains of SDC to meet the reporting requirements of NEI 99-02. The third train of SDC should be treated as an installed spare and is subject to the reporting requirements in NEI 99-02.

Kewaunee and Point Beach

Issue: The Kewaunee and Point Beach sites have overlapping Emergency Planning Zones (EPZ). We report siren data to the Federal Emergency Management Agency (FEMA) grouped by criterion other than entire EPZs (such as along county lines). May we report siren data for the PIs in the same fashion to eliminate confusion and prevent 'double reporting' of sirens that exist in both EPZs? Kewaunee and Point Beach share a portion of EPZs and responsibility for the sirens has been divided along the county line that runs between the two sites. FEMA has accepted this, and so far the NRC has accepted this informally.

Resolution: The purpose of the Alert and Notification System Reliability PI is to indicate the licensee's ability to maintain risk-significant EP equipment. In this unique case, each neighboring plant maintains sirens in a different county. Although the EPZ is shared, the plants do not share the same site. In this case, it is appropriate for the licensees to report the sirens they are responsible for. The NRC Web site display of information for each site will contain a footnote recognizing this shared EPZ responsibility.

Surry, North Anna and Beaver Valley Unit 1

Issue: The Safety System Unavailability Performance Indicator for PWR RHR monitors:

- **The ability of the RHR system to take a suction from the containment sump, cool the fluid, and inject at low pressure to the RCS, and**
- **The ability of the RHR system to remove decay heat from the reactor during normal shutdown for refueling and maintenance.**

The RHR system for Surry Units 1 & 2, North Anna Units 1& 2 and Beaver Valley Unit 1 provides function 2, shutdown cooling, and does not provide for function 1, post accident recirculation cooling. Function 1, is provided by two 100% low head safety injection pumps taking suction from the containment sump and injecting to the RCS at low pressure and with the heat exchanger function (containment sump water cooling) provided by four 50% capacity containment recirculation spray system pumps and heat exchangers. How should the Safety system unavailability for these units be calculated?

Resolution: The RHR Performance Indicator should be calculated as follows. The RHR system should be counted as two trains of RHR providing decay heat removal, function 2. The low head safety injection and recirculation spray pumps and associated coolers should be counted as an additional two trains of RHR providing the post accident recirculation cooling, function 1.

Four trains should be monitored as follows:

Train 1 (recirculation mode)
"A" train consisting of the "A" LHSI pump, associated MOVS and the required "A" train recirculation spray pumps heat exchangers, and MOVS.

Train 2 (recirculation mode)
"B" train consisting of the "B" LHSI pump, associated MOVS and the required "B" train recirculation spray pumps, heat exchangers, and MOVS.

Train 3 (shutdown cooling mode)
"A" train consisting of the "A" RHR pump, associated MOVS and heat exchanger.

Train 4 (shutdown cooling mode)
"B" train consisting of the "B" RHR pump, associated MOVS and heat exchanger.

Beaver Valley Unit 2

Issue: The Safety System Unavailability Performance Indicator for PWR RHR monitors:

- **The ability of the RHR system to take a suction from the containment sump, cool the fluid, and inject at low pressure to the RCS, and**

- **The ability of the RHR system to remove decay heat from the reactor during normal shutdown for refueling and maintenance.**

The RHR system for Beaver Valley Unit 2 provides function 2, shutdown cooling, and does not provide for function 1, post accident recirculation cooling.

Function 1, is provided by two 100% containment recirculation spray pumps taking suction from the containment sump, and injecting to the RCS at low pressure. The heat exchanger function is provided by two 100% capacity containment recirculation spray system heat exchangers, one per train.

How should the safety system unavailability for BVPS Unit 2 be calculated?

Resolution: The RHR Performance Indicator should be calculated as follows. The two containment recirculation spray pumps and associated coolers should be counted as two trains of RHR providing the post accident recirculation cooling, function 1. The RHR system should be counted as two additional trains of RHR providing decay heat removal, function 2.

Four trains should be monitored as follows:

Train 1 (recirculation mode)

Consisting of the containment recirculation spray pump associated MOVS and the required recirculation spray pump heat exchanger and MOVS.

Train 2 (recirculation mode)

Consisting of containment recirculation spray pump associated MOVS and the required recirculation spray pump heat exchanger, and MOVS.

Train 3 (shutdown cooling mode)

Consisting of the "A" RHR pump, associated MOVS and heat exchanger.

Train 4 (shutdown cooling mode)

Consisting of the "B" RHR pump, associated MOVS and heat exchanger.